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Editor: D. B. Finn

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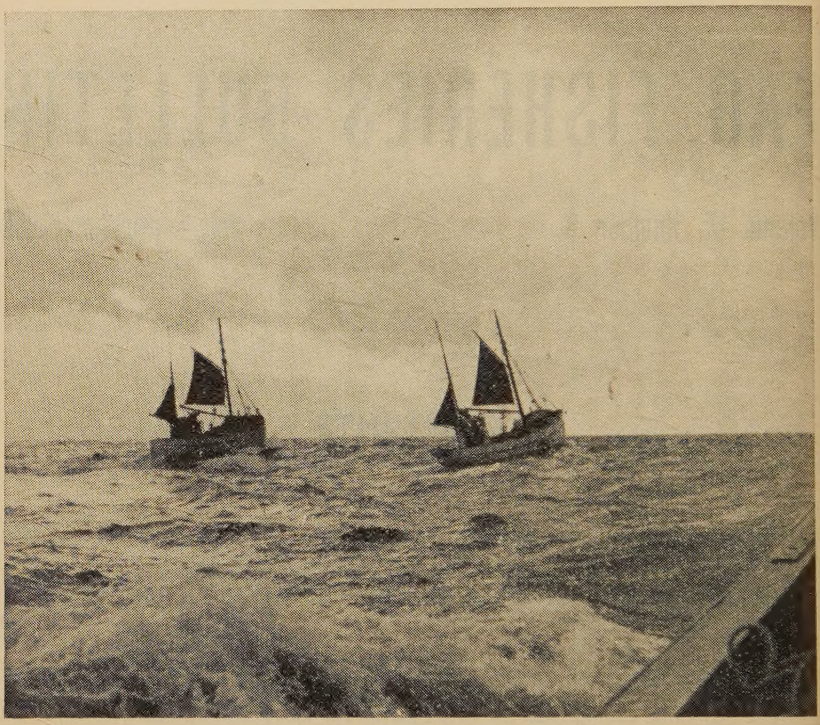
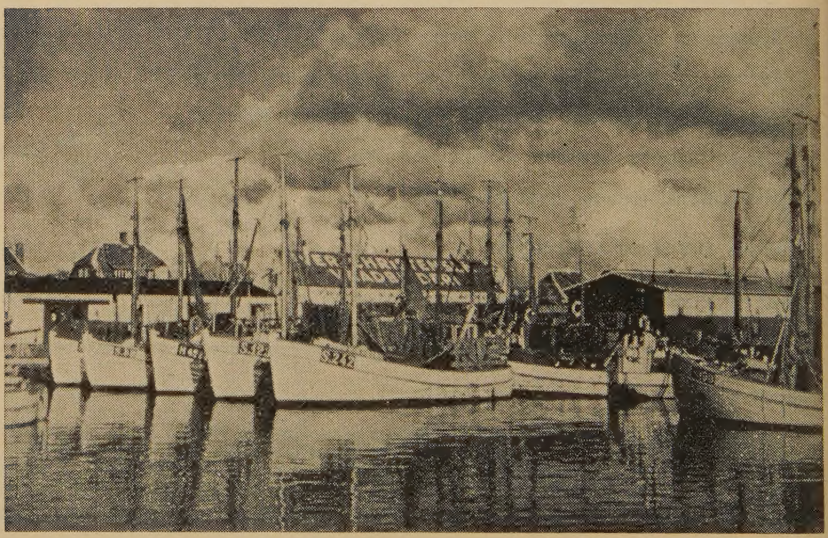


A pair of Danish cutters at sea.



Typical Larsen trawlers in harbor at Skagen, Denmark (photos by courtesy of Alan Glanville).

THE LARSEN MID-WATER TRAWL[1]

I. History

This method of fishing was invented in 1948 by Robert Larsen of Skagen, Denmark. Originally intended for catching herrings off the Jutland coast, the Larsen mid-water trawl soon proved so effective that it is now in regular use in Scandinavia and other parts of Europe. Herrings, sprats, anchovies, mackerel and other pelagic fish are commonly caught with this gear which, owing to its low initial cost and simple operation by relatively small crews, may in some cases supplant the much more expensive ring nets and purse seines.

II. Method of Operation

Briefly, the Larsen trawl consists of a square-mouthed, wingless trawl, which is towed in mid-water between two boats. The fish are located on the echo sounder and, by adjusting the amount of warp, the weights and floats on the net itself, and the speed of towing, the net can be regulated to fish at the desired depth (see *Figure 1*).

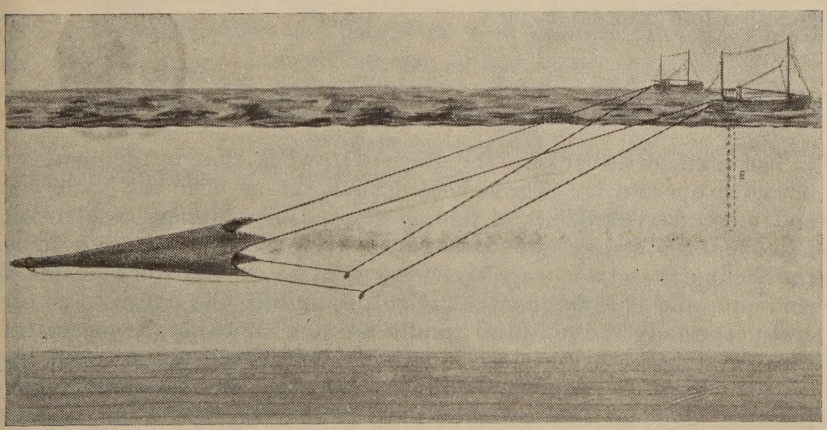


Figure 1. Fish located on the echo sounder.

III. Advantages

The superiority of this gear over conventional trawls lies in its ability to operate at any height in the water where the fish may be, from the surface almost to the seabed. Apart from this versatility, the ability to float in mid-water means that it can be

[1]By Alan Glanville, Brixham, Devon, England.

worked over rocks, coral or wreck-strewn areas that would prohibit the use of a trawl on the bottom. This, in turn, means that the damage to the gear due to snagging is extremely rare and expenses in this connection are kept to a minimum. The fact that no otter-boards are needed to maintain the horizontal spread of the net allows nearly all the power of the boats to be devoted to moving the net forward, with the result that a wider mouth-opening of the net and greater speed through the water can be maintained, than if the two boats were separately employing conventional trawling gear. The advantages of the Larsen trawl over the purse seine or ring net, in such cases where both methods can be used, lie in its low cost, ability to fish at greater depths and in more severe weather, and in its general ease of operation. In addition, conventional trawlers can be fitted out to work the floating trawl in a matter of hours, and after the season return immediately to bottom fishing, whereas purse seining does not readily mix with other methods of fishing, fitting out for this gear being far more involved.

Compared with drift or gill netting, that universal method of catching pelagic fish, the advantages of the floating trawl are that it can be fished at greater depths than those reached by a drift net, and the quality of fish caught is better because a considerable percentage of drift net fish are invariably badly damaged on being shaken out of the nets. Here again, the Larsen trawl is less expensive than a fleet of drift nets, covers a greater area and requires less manual labor.

IV. Disadvantages

The main drawback to the Larsen trawl is that it requires two boats to operate it. These boats should be as near the same size and power as possible, and finding compatible skippers to identical boats is not always easy. In areas to which this technique is new, the feeling that two boats are being used to do the work of one is common, and it is frequently difficult to induce the crews to co-operate especially if the initial results are not immediately successful. Fishing skippers are almost invariably individualists and each has his own ideas on where and how to fish, and the thought of subjugating his ideas to a common plan is not very appealing. These difficulties, although somewhat intangible, are none the less real, and can only be overcome by experimentation and perseverance.

Technical drawbacks are that it does not work well in very clear water in the daylight or at night, if there is phosphorescence or " fire " in the sea. At these times the fish can see the net long before it reaches them and escape accordingly. This may well be the case in the tropics. Should the fish be on, or very near, the bottom as herrings and sprats frequently are during the daytime, the floating trawl then becomes less effective than a bottom trawl for the reason that its vertical height has no advantage and its

lateral spread is far less than that of a wing trawl. For this reason the Scandinavians usually work Larsen gear at night when the fish are up in the water, and employ bottom gear during daylight hours.

The floating trawl is also only effective when fairly large and compact bodies of fish are encountered. It has not been proved worthwhile when the fish are very thinly scattered over a wide area, in conditions when drift nets operate satisfactorily. Unlike the drift net which only catches fish of a certain size, the Larsen trawl is non-selective, different sizes and different species often being taken together, with the result that it is impossible to separate them. Again, many fast swimming fish, such as tuna that are caught with drift nets and purse seines, cannot be taken with the floating trawl although the increasing use of nylon and a larger mesh may result in greater towing speeds and help to overcome this deficiency.

V. *Conditions Necessary for Successful Operation*

The natural requirements are :

Ground : any type.
Tide : the less the better, not more than 4 knots.
Water : any depth, not too clear, no phosphorescence.
Weather : force 5-6 Beaufort wind scale minimum, depending on the size of the boat.
Fish : concentrated, not scattered. Not on the bottom. Preferably slow moving, schooling species. The schools must be detectable on the echo sounder.

The mechanical requirements are :

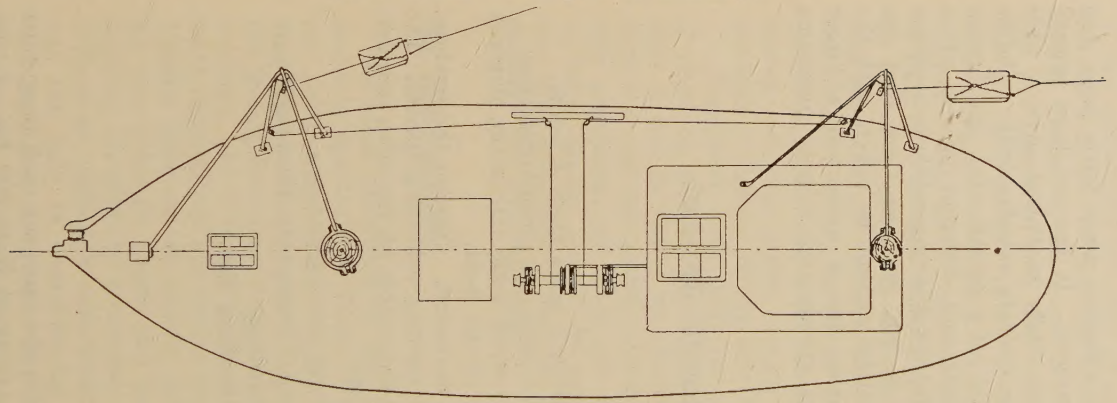
Size of boat : 45 to 75 ft. (13.65 to 22.75 m.).
Engine : 40 to 200 h. p. Preferably Diesel and suitable for trawling.
Echo sounder : capable of detecting fish.

VI. *Fitting Out*

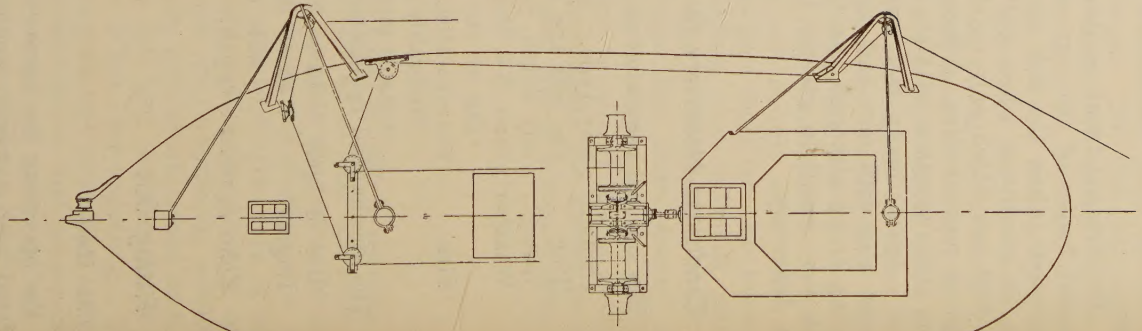
(*a*) *The Boats*

For operating the Larsen trawl in the open sea each boat must be fitted with a winch capable of taking at least 200 fm. of wire ($1\frac{1}{4}$ in. to $1\frac{3}{4}$ in. or 30 to 45 mm.) on each drum, together with a pair of gallows and the necessary fairleads and bollards. In Denmark, the trawl winches are usually placed fore and aft and both warps are towed from the after gallows, but in most other countries winches are athwartships and the warps are towed through a towing block over the quarter (see *Figures 2* and *3*)

Trawl Winch for Lengthwise Installation



Trawl Winch for Athwartship Installation



Figures 2 and 3 — Different types of deck layout (courtesy Andr. Jensen & Sonner Maskinfabrik, Skagen, Denmark)

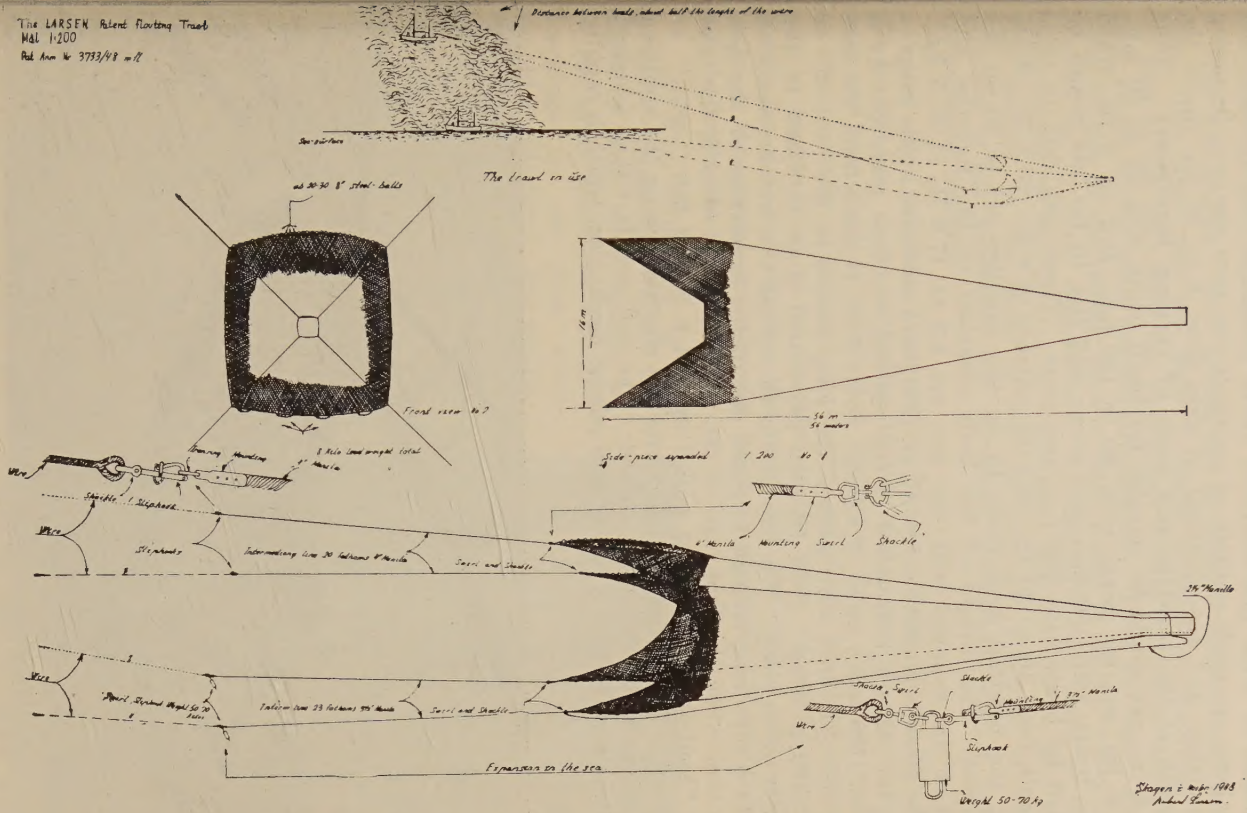


Figure 4. Diagram of an 8 fm. trawl.

(*b*) *The Gear*

(*i*) *The net.* The floating trawls supplied by Robert Larsen of Skagen or those manufactured under license to him by other net makers, are made entirely of cotton (nylon nets are soon becoming available) and are produced in sizes from 4 to 10 fm. sq. in the mouth of the trawl to suit boats of varying horsepower. Thus a 4 fm. net would be suitable for small boats with 40 to 50 h.p., a 6 fm. net for boats with 80 to 120 h.p., and an 8 fm. trawl for boats with 150 h.p. and over ; and the 10 fm. net would be used by boats with 200 h.p. and more. These nets vary in total length from 16 to 30 fm. and the number of 8 in. (20.3 cm.) floats on the headline runs from 15 on the smallest net to 30 on the largest. The weight of the leads attached to the footrope and which are supplied with the net are 8.8 to 17.6 lb. (4 to 8 kg.). The mesh is graduated from 6 in. (150 mm.) stretched in the wings to $^3/_4$ in. (22 mm.) stretched in the cod end, which is protected by a 4 in. (100 mm.) mesh of nylon. Some 5 ft. (1½m.) from the end of the cod end a wire strop 2 fm. long, known as the "cut-off" or "splitting strap," runs through galvanized rings attached to the outer nylon mesh. The two eyes at the end of this wire are shackled into a rope long enough to reach one of the lower toes of the net, so that when the foot rope of the net is brought aboard, the rope or "haul-up" line can be pulled up and a bag of fish "split," or cut off. The gilson is hooked into the shackle joining the splitting strap and the fish hove aboard. The cod end is either fastened with a rope or with a patent wire release mechanism which is rapidly

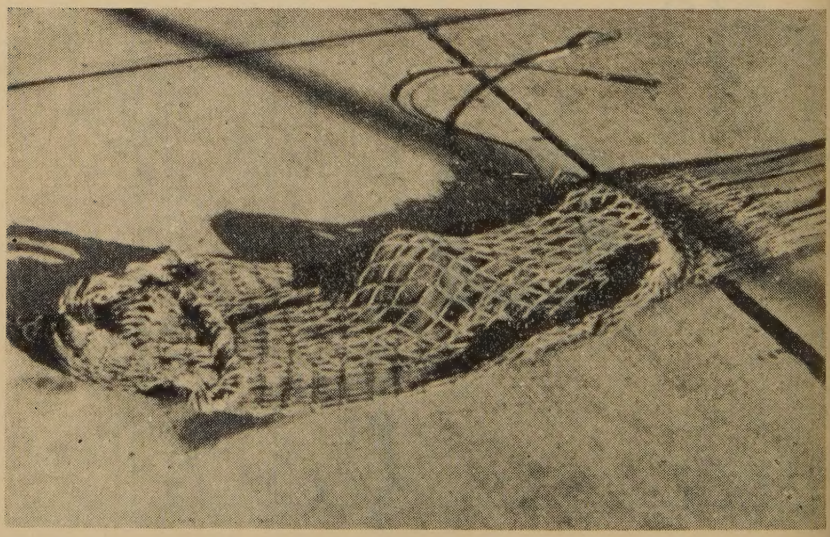


Figure 5. A cod end with nylon mesh cover and wire splitting strap (photo by courtesy of Alan Glanville).

becoming popular. The 8 in. floats, which may be either metal or plastic, and which will be supplied with the net, are distributed evenly along the headrope and the small lead weights likewise attached to the footrope.

(*ii*) *The bridles.* The bridles are of flexible combination wire rope. The lower pair are slightly longer (2 to 3 fms., according to the size of the net) than the upper pair which, having to take the main strain of the gear, are slightly heavier. Thus the upper and lower bridles in the smaller sizes of trawl would be 16 fm. × 2¼ in. and 18 fm. × 2 in. respectively (5.7 and 5.01 cm.), and in the largest sizes 26 fm. × 2½ in. (6.35 cm.) and 29 fm. × 2¼ in. The swivels in the ends of the bridles are shackled to the thimbles in the headrope and footrope extensions using a large harp-shaped shackle.

(*iii*) *The weights.* These vary in size from 132 to 352 lb. (60 to 160 kg.) each, according to the size of net, power of the boat and the depth at which it is desired to fish. They are made of iron, usually cylindrical in shape and must be fitted with a ring to enable them to be shackled to the wire. A swivel should always be shackled between the warp and the weight and again between the weight and the slip hook to which the lower bridles will be made fast (see *Figure 6*).

(*iv*) *The wires.* It is extremely important that the wires of both boats should be of the same thickness and the markings on all four wires should be identical. For smaller boats fishing in shallow water, marks every 20 fm. up to 100 fm. will suffice, but obviously the deeper it is desired to fish, the more wire and power required. The big Swedish boats with 200 h.p. and 500 fm. of warp, are capable of fishing down to 100 fm. with the floating trawl. Most of the Scandinavian boats use 1¼ in. wire, but thicker warps up to 1 ¾ in. are quite satisfactory as long as they are all the same. When all the wires have been measured and marked and wound on to the drums, they should be led through the fairleads to the gallows and the after warp on each boat shackled to the weight, so

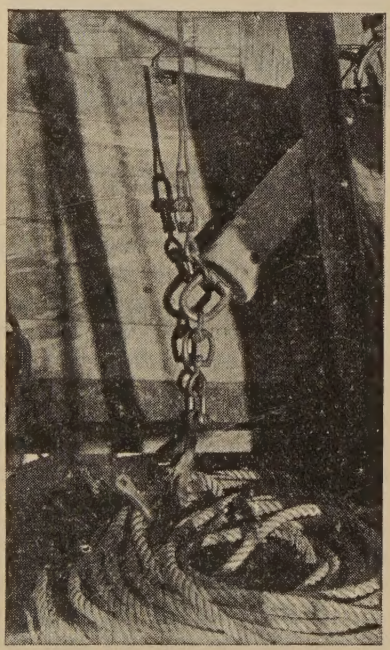


Figure 6. Detail of weight with swivels and clip hook (photo by courtesy of Alan Glanville).

that it hangs in the gallows with its lower end made fast to prevent it swinging and the clip hook ready to take the lower bridle (see *Figure 7*).

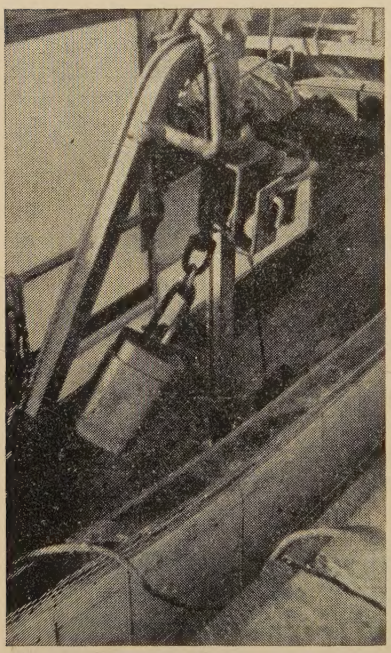


Figure 7. After gallows showing weight of approximately 154 lb. (70 kg.). Note extra sheave for forward warp (photo by courtesy of Alan Glanville).

VII. Finding the Fish

The invention which has made the use of the floating trawl possible is the echo sounder.[2] Without it, fishing by this method is sheer luck, a completely hit or miss affair, and *it is not recommended that any fishing should be tried with this gear unless at least one of the boats is fitted with an instrument of this type, and unless concentrations of fish have been consistently located in mid-water by echo sounders.* The approximate locality in which it is expected the fish may be found will probably be known before the boats set out, and the presence of birds, diving ducks, porpoises and the like may also help to pinpoint the whereabouts of the quarry, but it is the echo sounder alone that can positively identify the fish to the fisherman, tell him whether there are worthwhile quantities to work on and, if so, at what depth to tow.

Unlike bottom trawling, where there is no alternative but to fish on the sea-bed and in the water immediately above, the

[2]See *FAO Fisheries Bulletin*, 5(3/4) : 95-119 " Some Modern Methods of Fish Detection. "

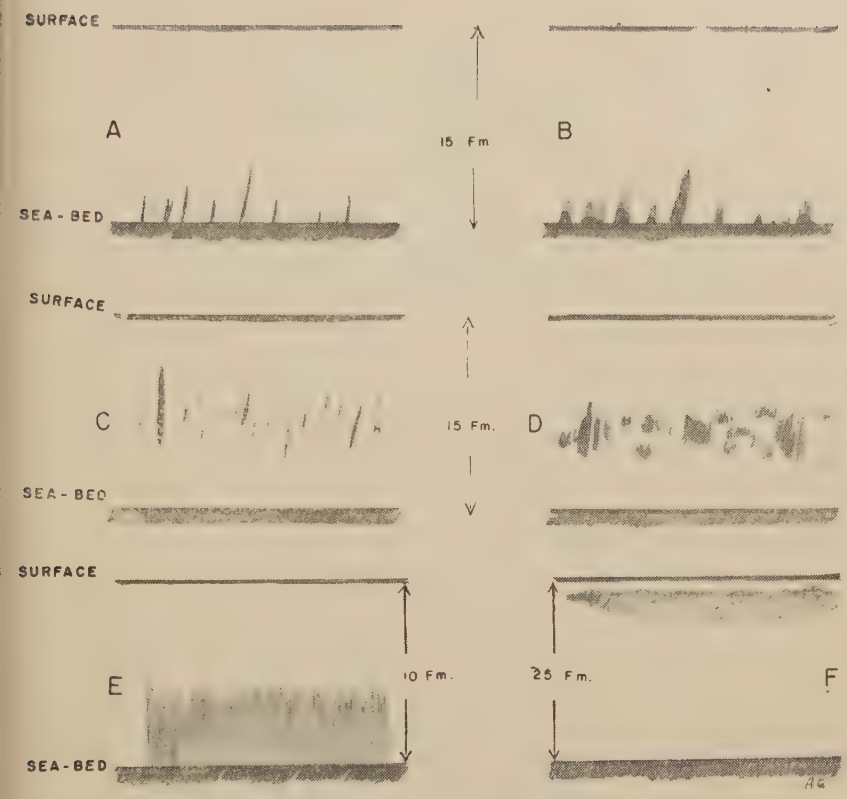


Figure 8. Some typical echoes.

A. Recordings made by isolated concentrations of fish on the bottom when the vessel is steaming. Due to the speed of the boat, the stylus or pen of the recorder may only have time to make one or perhaps two strokes for each patch of fish.

B. Shows how the same fish would appear at trawling speed when the pen has time to make several strokes on each echo. These echoes are typical of many pelagic fish that go to the bottom during the daytime, such as herring, brisling and pilchards.

C and D. Show fish in mid-water at steaming and trawling speeds respectively. When herring and brisling rise from the sea-bed, they usually start to spread out or scatter, as shown in D. These conditions are ideal for floating trawls.

E. Trawling speed recording of brisling in an estuary where the strong tides prevent the fish from either settling in bunches on the bottom or coming up to the surface, with the result that they stay in a scattered layer from mid-water to the bottom and move down with the tide. In these conditions the length of warp should be adjusted so that the weights just skim the sea-bed and with the boats towing against the current, successful fishing can be carried on.

F. Trawling speed recordings of fish such as herring or brisling near the surface at night in rather deeper water. In these circumstances it is advisable to make use of large rubber and canvas floats to keep the net up (see *Figure 13*).

Note: for the sake of clarity, shallow water has been taken for these illustrations. The size of the markings are approximately to scale with the depths given.

floating trawl has the choice of operating in a considerable number of horizontal " layers " depending on the depth of water and the size of the trawl, and it is imperative that the particular layer where the fish are congregating most thickly should be known and the net made to tow through it.

The markings made by different classes of fish on an echo sounder often vary considerably, not only from each other, but also within the species, according to season, place and weather. Again, an echo that might make only one stroke of the pen recorder at steaming speed might appear quite a large " ball " of fish at trawling speed. Only experience can tell the markings of one type of fish from the other, and whether any particular markings are indeed the fish being sought, or merely fry, jelly fish, plankton or seaweed (see *Figure 8*). A safe rule is never to shoot without seeing markings on the sounder. The mere presence of echoes cannot guarantee a full cod end, but their absence will almost certainly guarantee an empty one.

VIII. Operating the Gear

(a) *Setting Out the Gear for Shooting*

The net should lay on the deck near the rail on the side from which the gear is to be operated. The foot rope should be on the deck, the headline on top of that, followed by the rest of the net with the cod end uppermost. The haul-up rope and the four bridles should be coiled down separately with the two bridles belonging to the boat in question forward and half of the two that will

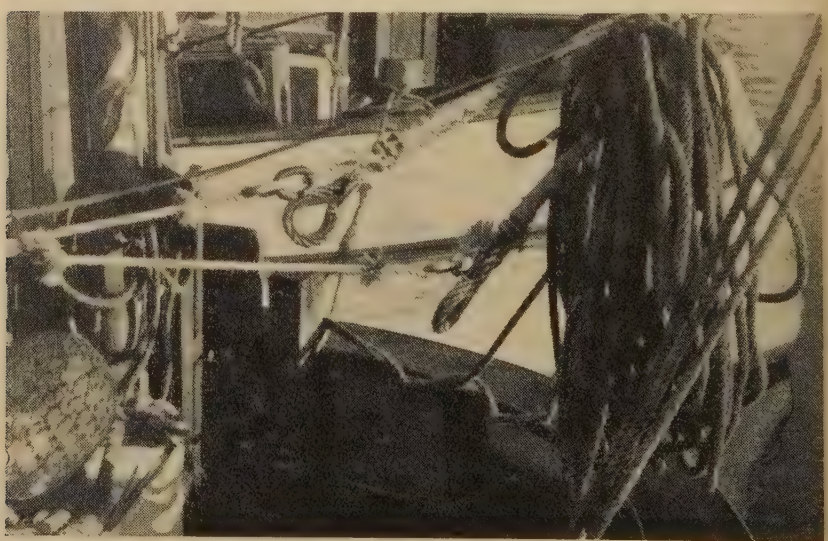


Figure 9. Combination wire bridles with heaving line attached with split links ready to be passed to the second vessel (photo by courtesy of Alan Glanville).

have to be passed to the other boat taken right aft. Each of the bridles intended for the second boat should have split links attached to them to take the split links of the heaving line. It is usual to put some type of mark on one of the bridles so that they can be quickly identified (see *Figure 9*).

(*b*) *Shooting the Gear*

When both skippers have agreed on the place to shoot, the amount of wire to let out and the direction in which to tow, the

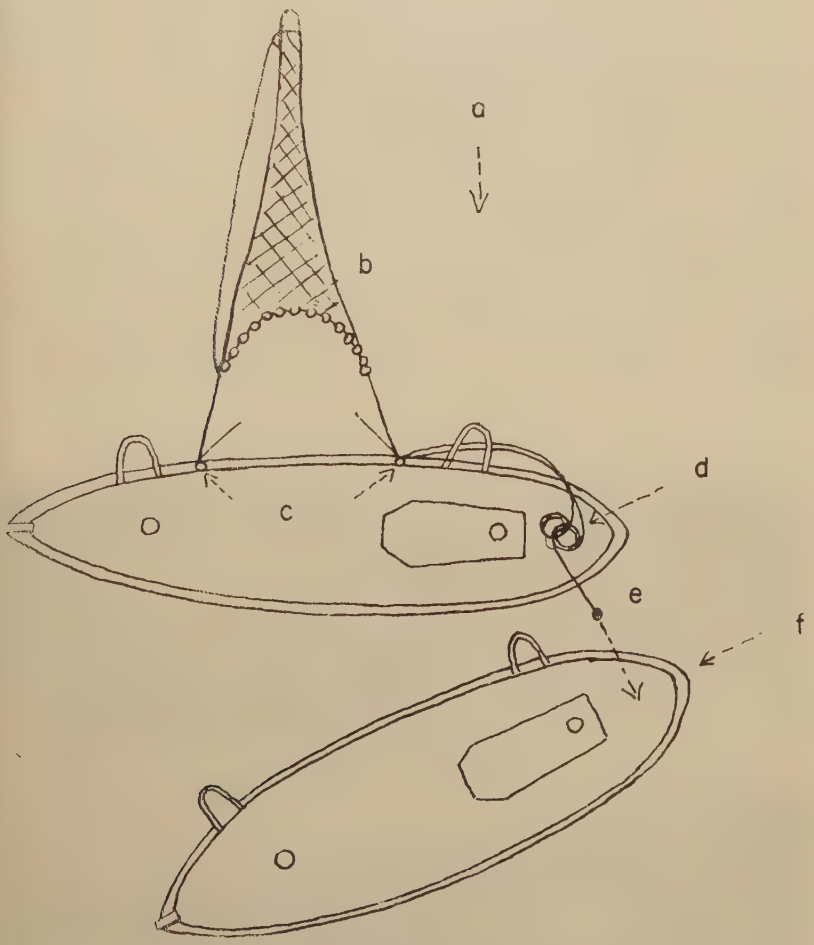


Figure 10. a) wind ; b) net ; c) bollards or cleats in rail ; d) bridles ; e) heaving line ; f) direction of approach.

Picking up bridles when both boats are stationary. When the net has been put in the water on the windward side from the first boat, the second boat approaches from astern and passes under the lee quarter so that the heaving line can be thrown.

ship is stopped broadside to the wind, in normal trawling fashion and the cod end, which has been previously fastened, thrown over to windward. As the cod end sinks down and away from the boat, the net and the haul-up rope are payed out until the whole net is in the water. When 3 or 4 fm. of the bridles have run out over the side, they are checked on two wooden bollards in the rail or two cleats on stanchions just below the rail. One of the bollards or cleats should be situated a few feet aft of the forward shrouds and the other just forward of the after gallows. The net will now be laying out in the water, 3 or 4 fm. from the boat, with the weight taken on the bollards so that the after set of bridles can be easily passed over to the other vessel (see *Figure 10*). The second vessel should now approach from astern and pass under the lee quarter, so that the heaving line can be thrown. With the boat stopped, the bridles are hauled aboard and made fast to clip links in the warps, the forward wire having been brought aft to the gallows in readiness (see *Figure 11*). At the same time, the remaining or forward pair of bridles are made fast to the warps that are ready in the gallows of the first boat, and when both vessels are ready the bridles are thrown off the bollards and the boats move slowly ahead and away from each other until they pick up the strain of the net and tow it evenly between them. At the same time the forward warp on the first boat is slacked out until it comes level with the after gallows, when it is picked up and put in the extra sheave.

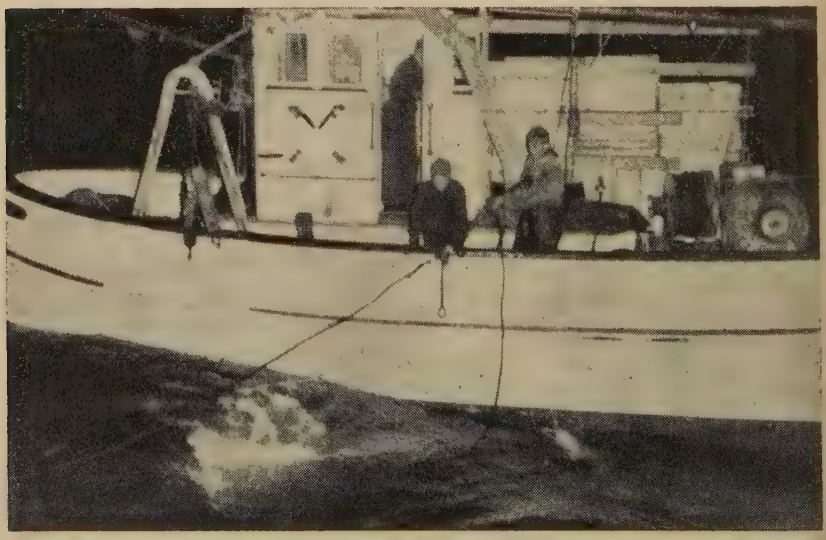


Figure 11. Picking up bridles when shooting. Note heavy weights hanging from gallows and forward wire stretched aft (photo by courtesy of Alan Glanville).

When both boats are on course the speed is increased and they bear slightly away from each other, running out the wires as they go. At this stage it is usual for the skippers to communicate by shouting to each other, but when the agreed amount of warp has been payed out and the boats have separated to their trawling positions, communication is usually carried on over the R/T.

(*c*) *Towing*

The amount of wire required to get the net down to any particular depth at a given towing speed is usually arrived at from experience, but in order to help those who are using this method for the first time, the makers of the Larsen trawl supply an instrument known as an inclinometer. This device, which is made of brass, is a cross between a spirit-level and a protractor, and when it is laid on the wire and leveled off, the angle of depression of the warp can be read off. Knowing this and the amount of wire run out, by referring to a special table supplied with the instrument, the depth of the far end of the wire can be calculated. In the case of the upper warp, this depth will be the position of the head line of the trawl, but the lower warp will indicate the position of the weight and the foot rope of the net will be slightly higher than this. Such calculations cannot be entirely accurate and only trial and error will show which length of warp gives the best fishing results with the fish at any particular depth. Several ways have been tried to determine the exact depth of the floating trawl, such as sounding it from a third boat, but the time taken up by experiments can often be employed more usefully in actual fishing and when a number of pairs are working in an area they will very soon find out which boats are catching the most fish and the rest will alter their gear accordingly. For an example, however, it can be said that when fishing for sprats and small herring, Danish boats often use 200 fm. of wire to take the net 40 fm. down at 2½ to 3 knots' speed. Roughly speaking, they reckon that for every 5 fm. of cable let out, the net will fish 1 fm. deeper at this trawling speed.

When a number of pairs are working in an area they very soon find out which boats are catching the most fish and the rest will alter their gear accordingly.

The distance between the two boats when towing is again a matter of experience, but is usually one-half of the length of the warps exclusive of the bridles. However, when only small amounts of warp are used — say, up to 75 fm. — the length of the bridles should be taken into consideration and half the total length taken as the distance. In all instances the station-keeping of the boats is done by eye, but it may be helpful in the first instance to stretch a measured rope between the boats, to give an idea of any particular distance, as appearances at sea are frequently very deceptive. The ideal for pair-fishing is to have two boats of identical size

with identical engines fishing at the same number of revolutions per minute but, as this is not always possible, the more powerful of the two vessels should keep station with the other and take the outside track when turning, if at all possible.

The speed of towing depends mainly on the type of fish, but usually the faster the better ; it is reported that some of the big Swedish craft are capable of towing up to 6 knots. The Danish boats tow at 4 knots for large herring, but slow down to 2½ to 3 knots when fishing for brisling (sprats) in order to avoid crushing them in the cod end.

The fishing time depends very much on the amount of fish through which the net is passing, and may vary from two hours if the fish are scarce to as little as ten minutes if the fish are extremely thick, the average time being one hour. A watch should be kept on the sounder to see that the gear is not towed too long through heavy markings, as not only can the weight of fish break the net, but if small fish such as brisling are crushed, they will die and be extremely heavy and difficult to get aboard.

When the fish are well up in the water and it is necessary to fish with the headline only a few fathoms below the surface, the large Scandinavian boats add three rubber and canvas floats to the headline in addition to the normal number of spherical floats. This has the effect of allowing the use of a greater length of warp without letting the net go too deep, particularly as the larger boats employ very heavy 264 to 330 lb. (120 to 150 kg.) weights. Short warps are to be avoided as they leave little room for maneuvering and, in bad weather, the weight of the boats can easily rip the net (see *Figure 12*).

Figure 12. Canvas and rubber floats used when fishing near the surface (photo by courtesy of Alan Glanville).

Many skippers when fishing near the surface with only 50 or 60 fm. of wire out, shortenthe lower warp by half a fathom. as it is felt that without a good length of warp the net cannot open fully in a vertical direction and therefore not all of the extra length of the lower bridles is required.

(d) Hauling

On deciding to haul, the boats head down wind and close in towards each other. When the gear is astern and to windward, both vessels keep moving slowly ahead and simultaneously heave in on the warps, staying about a boat's length apart. When both boats have brought their weights and bridles up to the after gallows, the way is taken off them and one set of bridles passed back to the original boat by means of the heaving line, as before.

The two bridles are taken round the stern to the windward side of the vessel and at the same time the skipper gives the boat a hard kick astern. This has the effect of allowing plenty of slack to be pulled in on the lower bridles and a couple of turns taken on the warping drums of the winch. The four bridles are then all pulled in together, the lower pair with the help of the winch and the upper two by hand. For this operation small rollers are usually placed in the rail for hauling the lower bridles and are afterwards removed.

When the net is reached, three of the crew haul in the net in the usual trawling fashion, using the swell to help and shaking the fish down as they go, while the fourth man pulls in the haul-up rope (see *Figure 13*).

When the slack of the net has been taken in and the fish hauled up alongside, the gilson or tackle is hooked into the shackle joining the splitting strap (see *Figure 14*).

Taking four or five turns around the large warping drum, the bag of fish is hove aboard (see *Figure 15*).

Figure 13. A large floating bag of brisling showing the haul-up rope being pulled in (photo by courtesy of Alan Glanville).

When the cod line or patent release is jerked open the fish are released, passing through an open bunker in the deck into a pound in the hold below. The cod end is immediately fastened again and thrown overboard and a few fathoms of the haul-up rope payed out. Then the other end of the net is pulled up, the fish forced down into the cod end, the haul-up rope pulled up again, the bag of fish hauled aboard and the process repeated, until the net is empty. One of these bags as illustrated holds approximately 1,000 lb. (454.5 kg.) of fish, but the size of the bag is frequently cut down by tying a rope becket around the middle so that the net cannot bulge to its full extent. This is done to prevent crushing of fish that are going to a cannery. Once the fish are down below they should be boxed and, if required for human consumption, preferably iced as well. In Danish practice, some of the boxes are carried in the hold and the rest stacked on deck on the port side of the wheelhouse. The fish are transferred from the pounds to buckets and put into boxes which are stacked athwartships (see *Figure 16*).

Figure 14. Brisling alongside vessel, ready to be taken aboard (photo by courtesy of Alan Glanville).

In conclusion, it is felt advisable to warn prospective users of this gear against the tendency to regard the floating trawl as a 'super-net' that will catch large quantities of fish when all other methods have failed.

Mid-water trawling has definitely been proved extremely successful in certain areas when operated under particular conditions of weather and fish behavior, but it is very far from being an all-round producer in the same class as the conventional bottom trawl, the long line or the drift net.

The decision to try this gear should be made only after commercial quantities of fish have been consistently located on the echo sounder and the other conditions necessary for successful operation have been observed.

Then, if the two skippers work together intelligently and patiently, using the sounder and the R/T to maintain the correct depth and station, there is every chance that success will crown their efforts.

Figure 15. Bag of brisling before the cod end is opened and the fish are dropped into the pound. The larger fish are stray herrings and mackerel. The large protective nylon mesh covering the cod end can be clearly seen (photo by courtesy of Alan Glanville).

Figure 16. Boxing and sorting brisling in the hold (photo by courtesy of Alan Glanville).

FISHERMEN'S ORGANIZATIONS AND THE REGULATION OF FISH PRICES IN SWEDEN

This article is a summary of the monograph of the same title, prepared for FAO by Christian Hessle, Chief, Bureau of Marine Fisheries, Royal Fisheries Board, Sweden, and Sigmund Verständig, Chief, Fisheries Branch, Agricultural Marketing Board, Sweden. The paper consists of five parts : Part I, a general survey of Swedish fisheries, the fishing population, trade and government administration, has been excluded from this summary.

I. The Early Development of the Fishermen's Organizations (Part 2)

The fishermen's associations formed before and during World War I were generally very localized and either did not seek, or did not achieve, co-operation with each other. After the first world war, here and there along the coasts, small associations of fishermen were set up. Bearing in mind the unfortunate experience of trading associations created during the war, these new small associations were mainly professional in character, and did not engage in selling activities. They were mostly groups of fishermen from one fishing village or from a small district, and sometimes were restricted to those within one district who practised a certain type of fishing. It was these small local associations, some already in existence in the nineteenth century, which formed and still form the basis for the large Swedish fishermen's professional organizations.

It was soon evident that these small associations could not accomplish much, unless they joined into larger units. Sometimes a small number of such associations formed a union, which was intended to cover a whole stretch of the coast ; the newly formed union then tried to bring about the formation of other local associations, missing in the chain, until there were member associates all along the coast line of the district.

Sometimes the large union and the local associations were created simultaneously. Local associations were formed ; at the same time the regulations and purpose of the union had already been roughly defined, and the union was then formally constituted at a meeting of the delegates from the newly established local associations.

As a result, an almost continuous line of small local associations, mostly connected to some union, was established along the coasts of Sweden, and at many of the lakes inland.

The unions once formed and consolidated, the local associations often began to lose some of their importance, as well as independence. Yet they still have an important function as they are

in the best position to take care of local interests. They also ensure that fishermen in more scattered and remote places are kept in touch with, and are enabled to participate in, the work of the union.

Usually it was energetic and resourceful fishermen who led the work of the organizations, and especially fishermen who had experience of union life elsewhere. Very often fisheries officers also assisted.

The fishermen were sometimes suspicious of the new organizations and, particularly in places where small, old associations already existed, were sometimes afraid that their right of self-determination would be restricted by joining a larger organization. Nevertheless, the progress of the organizations was comparatively smooth and, at the outbreak of World War II, most of the fishermen's organizations, both professional and trading, were fully operative.

II. *The Fishermen's Professional Organizations* (Part 3)

The aims of the fishermen's professional organizations are described differently in their respective regulations, but generally speaking they have the common objective of raising the economic and social standing of the members, on the assumption that this can be brought about without the organizations themselves engaging directly in trading activities. The professional organizations thus carry on a fairly wide range of activities.

All the large professional organizations petition the different public authorities in support of various measures designed to assist their members. In the absence of support from the Government, they will often seek the help of individual Members of Parliament in proposing certain measures to Parliament (*Riksdag*). In most cases the public authorities refer any proposed measures to the professional organizations for comment and advice. Moreover, since the fishermen's organizations are represented on the Royal Board of Fisheries as well as on the Advisory Council of the State Agricultural Marketing Board, they get frequent opportunities to influence decisions on such measures.

The large professional organizations, especially on the west and south coasts, also try to regulate fishing and the supply of fish with a view to making fishing as profitable as possible and to improving working conditions. In order to improve the quality of fish and to avoid surpluses, an organization may prescribe that, during a fishing voyage or during a certain limited period, only a certain quantity of fish may be landed. Furthermore, on the west coast, minimun sizes have been prescribed for a number of species of fish, on which no such control is imposed by the State. In many cases fishing on Sundays has been prohibited.

The unions often act as arbitrators in conflicts between different groups of interests within their spheres of activity. Sometimes

they also engage lawyers or other experts for the service of members who have to defend their interests at court or before state authorities, etc.

An important part of the work of the large professional organizations has consisted in organizing or co-operating in the formation of the fishermen's trading associations. A more or less intimate co-operation has generally been established between the professional parent organizations and the trading associations.

Several of the unions carry on a rather extensive educational program. For this purpose a special committee has been appointed within these unions, to arrange courses in subjects such as navigation, engine maintenance, book-keeping, civics, etc. The program also includes travel for purposes of study and lending library facilities.

Regional Unions

The five most important unions are the Swedish West Coast Fishermen's Union ; the Swedish South Coast Fishermen's Union; the Scanian Fishermen's Union ; the Swedish East Coast Fishermen's Union ; and the Swedish Lake Fishermen's Union. All except the Scanian Fishermen's Union publish professional journals.

The first three mentioned unions are built up from a number of local associations. Thus, these associations are members of the unions.

The Swedish East Coast Fishermen's Union has a somewhat different construction. According to its regulations, the Union will admit any fishermen's organization on the east coast of Sweden which has similar objectives to those of the Union and which undertakes to observe the regulations and decisions of the Union. In practice, however, local associations are not directly connected to the Union, but are members of different provincial organizations which, in turn, are members of the central union.

Members of the Swedish Lake Fishermen's Union are provincial organizations, as well as local associations.

At the head of each union there is a board which is elected at the ordinary annual meeting of the union (often called congress). The number of members of the board varies ; in certain unions there can only be five, and in others up to twenty. One of the members of the board is the president, who is usually appointed by the board itself, but, in at least one union, is elected at the annual meeting. The board, wherever possible, has representation from each of the different districts of the area of the union. It is entitled to appoint within itself an executive body for dealing with current, urgent or other business, and has at its disposal a number of employees, headed by an executive secretary.

To assist the unions in their work, a number of committees are appointed yearly, e.g. herring committees, mackerel committees, editorial committees, study committees, economic committees, etc.

The fishermen have to pay certain membership fees to their local associations. These fees can be of two kinds; either a fixed annual fee, or a levy fixed as a certain percentage of the amount received by the fisherman from the sale of his catch. Of these fees and levies, the local association pays an agreed contribution to the union. As far as is known, all local associations collect a fixed annual fee from their members.

In the Swedish East Coast Fishermen's Union and the Swedish Lake Fishermen's Union, no levies on sales have so far been collected. In the other three big unions, a levy on sales is paid, as well as a fixed annual fee.

The three unions on the west and south coasts have not received any government subsidies.

During its early years, the East Coast Fishermen's Union obtained an annual state subsidy, varying between S.Kr. 8,500 and 12,000.* Furthermore, in the year of its foundation the Union obtained S. Kr. 25,000 as an initial contribution, and was commissioned by the Government to organize the fishermen's trading associations on the east coast for the purpose of regulating the trade in Baltic herring, started in 1935. The Union has since kept close contact with these trading associations.

The Swedish Lake Fishermen's Union has also had to contend with difficulties in financing its work, and has obtained state subsidies for a number of years.

National Federations

The National Federation of Swedish Fishermen, with headquarters in Gothenburg, is a coalition of the large unions, through which about 14,000 fishermen are represented. According to the regulations of the National Federation, professional as well as trading associations can become members. So far, however, only the five big professional unions, i.e. the original founders, are members of the Federation.

At meetings of the National Federation, each professional union registered retains one vote for each 1,000 members registered and one for the remainder below 1,000. The annual fee is S. Kr. 1 for each such member. The annual fee of any trading association seeking membership would be paid in relation to its turnover.

The work of the National Federation has been comparatively limited. It has, however, made representations to the Government concerning the wishes and needs of the Swedish fishing populations, and has also represented the Swedish fishermen at international conferences.

The Swedish Fishermen's Study Union, also a coalition of the five big unions, was formed to co-ordinate the educational programs of the different unions, in consultation with public authorities and cultural organizations. The Union serves as the spokesman of its

* 1 Swedish kroner = 19.23 U.S. cents (S.Kr. 5.2. = U.S. $1.00)

member organizations in all matters concerning study and educational work. The program includes the training and education of members, creating a sense of responsibility towards their professional, economic and other organizations in the fishing industry, strengthening their feeling of solaridarity and understanding of the fishing profession, promoting social and civic interests, and encouraging interest in education and culture among fishermen in general.

Each affiliated organization is entitled to be represented at the meetings of the Union by one delegate for each 100 members registered and one for any remaining fraction of 100.

The affairs of the Union are in charge of a board, which has a National Study Leader at its disposal. Like similar organizations in other industries, the Union receives financial help from the State.

III. *The Fishermen's Trading Organizations* (Part 4)

Trading associations are closely connected with the professional organizations, and have in most cases been formed by, or in close co-operation with, such organizations.

The members of the trading association therefore generally belong to the corresponding professional organization. Membership of the professional organization is also in some cases a condition of membership of the trading association. Often the same person is a leader of both organizations.

The organizations' efforts among the fishermen in the commercial sphere — as in the professional sphere — really developed in the 1930's, even if here and there along the coasts the fishermen had previously joined together for collective purchases of requisites or for the sale of catches. This refers especially to the west and east coasts, where a great number of the trading associations now in operation were formed during the 1930's. On the south coast the co-operative trading system, with few exceptions, is younger and has mainly come into being only since the second world war. Along all stretches of the coast the formation of trading associations is still developing.

Most of the fishermen's trading associations are sales or purchase associations. Their main purpose is either to sell the members' catches or to procure fishing requisites on their behalf. A large number of sales associations, however, also buy fishing gear and fuel on behalf of their members.

Almost without exception the trading associations are co-operative associations without personal liability. The minimum amount that each member has to pay in the form of shares varies considerably from association to association. This is generally fixed at a certain number of Swedish kroner, often 50 to 100 per share, but sometimes a member is required to purchase shares in proportion to his income from the sales of fish delivered to the associa-

tion during a certain period, or in a few cases to the value of his fishing gear. Very often payment for share-holdings is effected through the association withholding a certain proportion of the proceeds of the sale of the members' catches. In order to increase the capital of the association, loans, to be paid in the same way as the share purchases, are sometimes taken up from the members. On shares and loans the association pays interest, and if the member leaves the association, he has a right to receive back the value of shares as well as of loans.

Sometimes the fishermen, with their limited resources, have been unable to provide, through the purchase of shares and loans, sufficient capital to finance co-operative trading. In certain cases, therefore, particularly on the west coast, the professional organizations have contributed either by the purchase of shares or by loans.

On the south and east coasts, however, the professional organizations have been able to provide only very limited financial support to the trading associations and, in 1934, the State created a special fund to supply the fishermen's trading associations with the necessary capital. For the first two years these loans are free of interest and repayments of principal, after which 3.6 percent interest is charged, and the loans have to be redeemed over a period of 10 to 15 years.

In many trading associations the members, i.e. the shareholders, are exclusively private fishermen. Very often, however, the fishermen are members of various organizations which are permitted to acquire shares in the trading associations.

The number of votes controlled by each member are as a rule proportionate to the number of shares he owns. Very often, however, the right of voting is limited, so that a member cannot vote for more than a certain maximum number of shares.

Fishermen, who directly or indirectly belong to a sales association, are often under an obligation to deliver their catches of all or certain species of fish to the association.

For the sale of the members' catches, several different systems are used by the sales associations;

(*a*) In a few cases the association acts as an *intermediary*, negotiating price agreements with the wholesalers or fish processors, who buy from the members. The members sell their catches individually and at their own risk to these dealers.

(*b*) The association takes over the catches, and then *sells directly*, or at a public fish auction, to wholesalers or fish processors.

(*c*) Most sales associations carry on actual *wholesaling*, more or less in competition with the private wholesalers. In some cases, especially in the smaller associations, they also do business on a retail basis at or near the places where they receive the catches from the fishermen.

It should be mentioned that the same association will often follow both methods (*b*) and (*c*).

The associations, especially those engaging in the wholesale trade, have in many cases acquired salting houses, filleting factories, freezing plants, etc., to absorb the fish they cannot sell fresh. As a rule the associations themselves build these factories, but in some cases they buy from a private company ; in a few instances they buy a private company outright and carry on business in the name of the old firm as a more or less independent subsidiary of the association.

A few associations on the west coast are mainly concerned with the processing, and subsequent sale, of members' catches.

The last method calls for considerably more capital and labor than the others ; this is particularly true where a number of different methods of processing are used.

Official Sales Associations

The official sales associations on the east coast occupy a unique position among the fishermen's trading associations. The special privileges which these associations enjoy reflect rather special conditions, which are examined below.

In order to create a more rational sales organization, a State Investigation Committee proposed in 1933 that the fishermen should get together in larger associations co-operating with each other, with the dual objective of centralizing the first sale of catches of Baltic herring in as few hands as possible, and of regulating landings as far as practicable.

This proposal was accepted by the state authorities, and, since 1 March 1935, the trade in Baltic herring has been regulated accordingly.

Under the regulations at present in force the trading associations, by special sanction of the Government, can obtain the sole right to receive and sell Baltic herring landed along a certain stretch of coast. An association which has obtained such a right is called an "Official" fish sales association. Such an association must represent either 75% of the full-time professional fishermen or 65% of those active within the area.

The original decree, through which ten fish sales associations along the east coast were given such rights, applied only to herring caught in the Baltic and the Gulf of Bothnia and landed along those coasts ; under the present decree, all species of fish can be subjected to such regulation, on all the coasts, and inland. Since these provisions have not yet been applied, the following account deals only with the regulations for Baltic herring.

Where an association exercises the sole right of sale of Baltic herring the fishermen are bound, by the same token, to deliver for sale by the association all their catches of Baltic herring, unless other arrangements are specifically approved by the State Agricul-

tural Marketing Board. Such exceptions have been to the effect that fishermen may sell Baltic herring direct to a consumer to cover his private needs, on condition that the sale takes place within 3 miles (5 km.) of the place where the fish is landed ; the sale must not take place in a regular fish shop without the permission of the Marketing Board. In some instances the fishermen have been permitted to sell also outside the 3 mile radius.

As a condition of its sole right of sale of all landings by its member fishermen, an association is obliged to accept any Baltic herring landed by fishermen who are not members of the association, under the same conditions as apply to its members. Where, however, landings are likely to exceed substantially the demand for the fish in its fresh state, an association, with the approval of the Marketing Board, may give preference to fishermen who regularly supply fish to the association or for whom fishing is the main or essential source of income. In times of glut supplies, therefore, the professional fishermen, as compared with part-time or casual fishermen, will receive the benefit of the highest prices prevailing for fresh Baltic herring. In practice, approval to exercise such preference has been granted to only two associations.

The private wholesalers are compelled to buy from the associations by virtue of the latter's sole rights of sale, but the associations themselves which also engage in the wholesale trade are now responsible for about half of the total wholesale trade in Baltic herring. To prevent unfair competition on the part of associations, and thus to make it possible for the private and the consumers' co-operative wholesale trade to compete on equal terms, special regulations have been issued. An association is free to fix a minimum wholesale price within its area, but it is obliged to give a certain minimum discount, fixed by the Marketing Board, on all purchases by wholesalers. The right to obtain this discount is confined to a limited number of merchants who have been officially approved by the Marketing Board as fully qualified to engage in the wholesale trade in Baltic herring. Authorized wholesalers, including all the associations, may not directly or indirectly sell below the wholesale price fixed for the area. Furthermore, when demand exceeds supply, the sales associations are required to allocate landings among the wholesalers in proportion to their earlier purchases.

An official sales association must operate in accordance with the regulations of the Marketing Board, which is responsible for supervising the activities of the associations and deals also with questions concerning the regulation of the trade in Baltic herring. The regulation of the Baltic herring trade, introduced to promote more stable and more equitable conditions of first-hand sale, represents a far-reaching measure of governmental support unequalled in any other section of the fishery industry in Sweden. It has undoubtedly been of benefit to these fishermen. However, the

system is thought to have certain disadvantages, and the question of the continuing need for the powers enjoyed by the associations comes up for discussion periodically.

At present there are 10 official sales associations. To these associations are affiliated 143 local associations of fishermen with a total membership of little over 5,000, and an individual membership varying from about 10 up to 200. In order to increase the strength of the official sales associations, modifications in their constitutions have been considered and, in some cases, carried out, so that the fishermen shall be directly represented and not only through their local organization.

The various sales associations have mainly the same constitution and in all essentials carry out similar activities.

The aim of the associations is to sell the members' catches in fresh or processed condition, to carry on processing, and to purchase and supply members with gear and other fishing requisites. An association should plan its activities in closest possible co-operation with other similar sales associations.

Membership of an association is open to any local organization within its area, which has similar aims and which requires its members to deliver their catches of Baltic herring to the association, with the exception of the herring required for the member's own consumption or which is sold direct to consumers. Such local bodies must deliver to the association all catches of Baltic herring which they receive, if no other agreement has been made between them and the board of the association. Fines may be imposed in respect of any contraventions.

At the meeting of the association each local body is represented by one delegate plus one delegate for each 50 members registered and one for the remaining fraction thereof.

The capital invested in the sales associations by the fishermen — through their local organizations — generally takes the form of shares or loans. The amount of such investments is usually fixed, but varies among the different associations. Payment for shares and loans is effected through regular deductions from the receipts from sales. Part of the capital reserves of the association derives from a levy of one-tenth of an öre per 2.2 lb. (kg.) on all fish delivered by the fishermen during the year, also from the retention of part of the net profits of the association.

The local organizations which are also trading associations, have, in practice, rather limited functions. Apart from the appointment of delegates for the meetings of the central association, they provide an important means of liaison between the fishermen and the central association. Moreover, these local bodies can promote discussion of their particular interests at meetings of the association. In some places, however, they also have certain rights regarding the sale of their members' catches. These sales are handled independently by the various sales associations.

Some Special Trading Associations

The East Coast Fish, a central organization which handles certain sales on behalf of the official sales associations, was founded in 1944. It serves one very important purpose, by arranging for the sale of Baltic herring from those sales associations with surpluses, to those where demand exceeds supply. This organization also handles the export of surplus herring on behalf of the official sales associations. East Coast Fish also has some price regulating functions (*see* p. 142).

Two associations, the West Coast Fish and South Coast Fish, were founded in the spring of 1946 in connection with the introduction of the price regulation system now operating along the west and south coasts (*see* pp. 140-42), which was conditional upon the setting-up of the associations. According to the agreements preceding the information, the Government stipulated that, if the professional fishermen's organizations on the west and south coasts called for price support from the Government they must, through their own trading associations, take over any surpluses of fish from their members, and utilize them as far as possible. West Coast Fish also handles the export of fish from the west coast, to countries with centralized import arrangements.

In view of certain problems arising from the centralized importation arrangements which operate in certain countries, it was found desirable for the Swedish exporters to co-operate in special organizations which, under certain conditions, have been granted sole rights of export of certain species to those countries. On the south coast, one such organization — South Swedish Export Fish — in Malmö, was formed in 1950. Members are fishermen's organizations, fish dealers and private companies operating on the south coast. Half the shares of the association are owned by the fishermen's representatives and half by the fish dealers and their organizations. The activities of the association are supervised by the Marketing Board which appoints an independent chairman of the association.

In 1946, a similar export association was formed on the west coast, but its activities ceased in 1949. Licences for the export of fish from the west coast to countries with centralized import are, at present, issued in the name of the West Coast Fish price regulation association. This entails co-operation between the fishermen's and the export dealers' interests.

There has been no need of special measures in the instance of Baltic herring, which can only be exported by East Coast Fish at the request of the official sales associations.

IV. Price Regulations (Part 5)

The Swedish fishermen made early attempts to stabilize prices and especially to avoid the low prices associated with heavy catches. Their first efforts consisted mainly in the restriction of landings, but

in some cases they also tried to establish minimum prices. In general, the latter measure was beyond the financial resources of the fishermen and their organizations.

The first real state price regulation was introduced on the west coast in 1934. Its purpose was to avoid unreasonably low prices by means of a system of *minimum prices*. The regulation was in force till the end of 1941, when wartime regulations were introduced.

During the years just before the second world war, price regulations of a somewhat different type were adopted also on the east and south coasts.

While the aim of the prewar regulations had been to improve the fishermen's earnings, the second world war slowly brought about a change in the objectives of government intervention in this as well as in other economic activities. The heavily increasing demand for fish during the war made it unnecessary to regulate prices so as to prevent their collapse during periods of heavy supply. On the contrary, the aim of the regulations was to prevent a continued rise in the price of fish resulting from food shortages by establishing *maximum prices* at all stages of distribution from the producer to the consumer.

After the war, fears arose that the fishing industry would encounter similar marketing problems to those prevailing after the first world war. A State Committee was appointed to consider the revival of price-support measures. Their report was submitted in 1947, and in the same year the Government laid down its policy concerning the fisheries.

Pending the outcome of the Committee's enquiries a new system of price regulation was introduced in the spring of 1946, taking into account peacetime market conditions. This system, which for the most part still operates, involves a return to the prewar system of minimum price regulations. A requirement of this system is that the fishermen's own organizations establish price regulation associations to take over all fish that cannot be sold by the organization at or above certain minimum prices. West Coast Fish and South Coast Fish, in which the large professional fishermen's unions on the west and south coasts are shareholders, were set up for this purpose. East Coast Fish is responsible, to a certain extent, for price regulation on the east coast, but of a very different character.

Regulations on the West and South Coast

The State Agricultural Marketing Board and the State Committee of Price Control, after consultation with the fishermen's organizations, specify minimum prices for the most important species of fish. Fish which does not realize the minimum price — surplus fish — is taken over and marketed by the two price regulation associations. On the basis of the prices which these associations

expect to receive for these sales, and from certain contributions, the so-called price increments paid by the Marketing Board, the associations determine the prices to be paid to the fishermen for the surplus fish. This *guarantee price* is decided beforehand and is the lowest price which the fisherman can expect to receive for his catch.

Minimum prices are determined by the Marketing Board, together with the State Committee of Price Control. Where the two authorities cannot agree, the question is referred to the Government for decision. The price regulation association in question proposes the minimum prices, which implies that the fishermen are fully consulted prior to any decision taken by the Government. The views of the merchants and processors are also taken into consideration. In special cases the Marketing Board may also consult its Advisory Council on price regulation questions before taking any decisions.

The scale of the *price increment*, as well as the species of fish for which it shall be paid, is decided by the Marketing Board after the price regulation association in question has been consulted. At present, price increments are authorized for all fish for which the Marketing Board has established minimum prices. In practice, price increments are paid only on surpluses landed in certain large harbors on the west and south coasts, and only for fish which meets a high standard of quality.

The Marketing Board has prescribed certain conditions for the payment of price increments. Thus it lays down that a price regulation association must accept fish from fishermen living in the area of the association, even if they are not members of an organization affiliated to the association. The fishermen, however, unlike the Baltic herring fishermen on the east coast, are not obliged to deliver their surplus fish to the association. If, however, a fisherman should sell fish privately below the minimum price without the approval of the price regulation association, the latter can refuse to accept his surplus fish in future. The same applies if a fisherman does not observe any restriction on landings imposed by the fishermen's organization with the approval of the Marketing Board. If the price paid by the price regulation association for fish delivered by a non-member is less than that paid to member fishermen, the difference must not exceed 3 öre per kg. The Board further requires that a price regulation association or its affiliated organizations shall not limit catches by any restrictions not approved by the Board and that they shall observe whatever restrictions on landings are decided by the Board as desirable at any particular time. A price regulation association is also required to report to the Board each month as to its income and expenditures on the purchase and sale of surplus fish.

While minimum prices and price increments require governmental sanction, the price regulation associations have the right to determine the prices to be paid to the fishermen for fish taken

over by the association, i.e., the guarantee price. This is the lowest price the fisherman can receive for his catches. The guarantee price is fixed beforehand and known to the fisherman before he starts a fishing voyage and is determined, firstly, by the prices at which it is estimated that surplus fish can be sold and, secondly, by the price increment which can be obtained from the Marketing Board. Since the guarantee price is dependent on the amount of the price increment, the Marketing Board is in a position to influence the level of the guarantee price paid to the fishermen.

Regulations on the East Coast

Price regulations on the east coast apply only to Baltic herring. As the fishermen's official sales associations on the east coast have acquired from the Government sole rights of sale of this species, they can maintain a satisfactory level of price without recourse to minimum prices. The associations have been given the right, each in its area, to fix wholesale prices for Baltic herring, sold fresh on the home market (about 70% of the catches).

The price regulation administered by East Coast Fish consists in fixing and maintaining certain guarantee prices for most of the Baltic herring, which cannot be sold fresh on the domestic market (surplus herring). For this purpose the association receives from the Marketing Board certain government grants called price equalization subsidies, which must be used in a manner approved by the Board. Accordingly, price regulation is confined to the use of these subsidies from which East Coast Fish makes payments to the various official sales associations concerned, to enable them to purchase surpluses at guarantee prices as fixed by East Coast Fish. The utilization of such surplus herring is the responsibility of the official sales associations, which apply to East Coast Fish for the export of this herring.

Financing of the Regulations

The price regulations on all coasts are self-supporting, being financed from *price regulation fees*, collected principally from the first-hand buyers. Such fees are paid both on Swedish catches and on imported fish, but only in respect of fish sold for consumption fresh on the home market (east coast), or sold at, or above, the minimum price (west and south coasts). In the west coast price regulation area such fees are collected on most species of sea fish caught by Swedish fishermen, and therefore also on some species of fish which are not subject to price regulation.

The price regulation fee must be paid on the first sale of the fish and as a rule must be paid by the buyer (a dealer or a fishermen's organization). It is the buyer's responsibility, in accordance with directions given by the Marketing Board, to provide such information regarding his purchase of fish and the use of such for different purposes, as is required to ensure that the regulation

fees are duly paid. Furthermore, upon request, he is bound to provide the Marketing Board or its representative with any other information that may be required for the purpose of supervision. In harbors where auctions are held, the price regulation fee is collected at the auction.

The collection and the supervision of the fees on domestic landings are undertaken by a Controller and local representatives of the Marketing Board. The collection of the fees on imported fish is handled by the Customs authorities.

Conferences and Meetings

UN Economic Commission for Asia and the Far East (ECAFE)

The Twelfth Session of ECAFE took place in Bangalore from 2-14 February 1956. Delegates from 32 countries attended. FAO was represented by Mr. A.H. Boerma, Director of the Economics Division, Mr. F.E. Popper, Chief of the Economics and Statistics Branch of the Fisheries Division, and Dr. T.J. Job, Assistant Regional Fisheries Officer for Asia and the Far East.

Two items on the agenda had a direct bearing on fisheries : first, " Activities of the Secretariat in the Field of Flood Control and Water Resources Survey " and, secondly, " The Report of FAO. " The first item was considered in detail in committee, and in a statement Mr. Popper drew the attention of the meeting to a rather specialized and therefore somewhat neglected aspect of multi-purpose river development and water resources projects —the use of bodies of water for the production of much needed protein food in the form of fish. Water development schemes, when undertaken without regard to fisheries, were likely to upset the natural balance and to reduce the supply of fish in these waters. It was important that this problem be considered in the early stages of a project, and that it should receive the attention of planning and development authorities. The estimated acreage of cultivable inland waters in the ECAFE area was approximately 40 million hectares ; these waters, under proper management, could make a very substantial contribution to the unsatisfied protein requirements of the population.

In his speech introducing the FAO Report, Mr. Boerma included a substantial section on fishery problems, in which he followed the argument set out in the paper " Some Basic Economic Problems of Fishery Development in South and East Asia " (*FAO Fisheries Paper* No. 6, originally prepared for the FAO Regional

Consultation on the Selective Expansion of Agricultural Production and Consumption held in Ceylon in June 1955). He pointed to the urgency of the problems of fishery expansion in Asia, gave some examples of rapid development, and discussed briefly the chief methods of development and the hindrances which they are designed to overcome. In the debate, representatives from Pakistan, Japan, Indonesia and India, as well as the observer from UNESCO, took up the fisheries theme and discussed it in relation to the problems of their own country or organization.

International Institute of Refrigeration

Commission IV of the International Institute of Refrigeration met at Sidney Sussex College, Cambridge, England, from 6 to 10 April 1956. On 11 April the Commission convened at the Experimental Kitchens of the Scientific Adviser's Division, Ministry of Agriculture, Fisheries and Food, London.

Attendance at the meetings included representatives from Belgium, Denmark, France, Western Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, the U.S.S.R., and observers from the Fisheries and Nutrition Divisions of FAO.

Commission IV deals with " the application of refrigeration to foodstuffs and agricultural products." The President of the Commission, Dr. J.C. Fidler of the Ditton Laboratory, Larkfield, Kent, England, presided at the meetings.

On 6 and 7 April the subject of discussion was " Eggs, " and papers were presented and discussed on spoilage, germicidal dips, pasteurization, storage, protein denaturation and methods of quality assessment. On 9 and 10 April the subject was " Quality, " with emphasis on methods of assessment and problems of correlating objective and subjective results, during which the following papers were presented :

Bate-Smith, E. C.	" Introduction "
Harries, J. M.	" Quality Assessment "
Sheppard, D.	" Subjective Methods of Assessment of Quality "
Shewan, J. M. and Liston, J.	" The Objective and Subjective Assessments of Quality of Fish."
Borgström, G.	Preliminary communication regarding a procedure of pretesting testers (judges) for organoleptic evaluation
Chaponneaux, P.	" Qualité de la sardine : appréciation de la "tenue " par la mesure directe de la résistance des flancs"

Orshan, J.	" A Proposed Method for the Quality Control of Imported and Exported Frozen Fish "
Moreno Calvo, J.	" Paper Chromatography as an Analytical Tool in the Field of Cold Storage of Foods "
Callow, E.	" The Quality of Fat in Beef Animals "
Hautefort, M.	" Remarques sur les méthodes subjectives et objectives de détermination de la qualité des œufs en coquille ".
Brooks, J. and Hale, H. P.	"Fluorescence Measurement and Egg Quality "
Basille, D.	" Remarques sur les méthodes subjectives et objectives de détermination de la qualité du lait et celle des oeufs cassés congelés "

On the afternoon of 9 April the members of the Commission were taken on a tour of the laboratories of the Low Temperature Research Station at Cambridge. On the morning of 11 April at the Experimental Kitchens of the Ministry of Agriculture, Fisheries and Food, methods of conducting panel tests were described and discussed, and demonstrations were arranged.

Caribbean Hurricane Seminar (WMO)

The Caribbean Hurricane Seminar, proposed by the Eastern Caribbean Hurricane Committee of the World Meteorological Organization Regional Association for North and Central America, took place in Ciudad Trujillo, Dominican Republic, from 16 to 25 February 1956. The Seminar, which was arranged by the World Meteorological Organization (WMO) and the Technical Assistance Administration of the United Nations, in conjunction with the host country, was attended by 45 lecturers or participants. These included the Secretary General of the WMO, and came from Canada, Finland, France, French Senegal, India, Japan, Madagascar, the Philippines, Spain, and the U.S.A., and from nearly every country in the Caribbean and Central American region. FAO was also represented.

The Seminar was concerned with the collection of data and the advancement of research on the causes and movements of hurricanes with a view to improving the systems of prediction of their occurrence and movement in order that timely precautions might be taken against them. An account was given of past research in this field and of research work planned for the future. Of especial interest was a particularly ambitious United States project for their study.

Symposium on Perspectives in Marine Biology

A symposium on " perspectives in marine biology " was held at La Jolla, California, U.S.A., from 23 March to 2 April 1956, under the auspices of the International Union of Biological Sciences and sponsored by the University of California, Scripps Institution of Oceanography and by the Office of Naval Research, United States Navy. There were 120 participants, of whom 33 came from overseas.

The symposium sessions took place, with one exception, at the La Jolla Hotel but participants spent much time on excursions to deep sea areas of San Diego (where they saw demonstrations of collecting equipment), to the Mount Palomar Observatory, the San Diego Zoo, and the Borrego Springs in the De Anza Desert. The symposium was organized to provide plenary general sessions for presentation of papers and discussion sessions of " idea " groups. The idea groups were composed of those participants who had been specially invited (as distinct from those who had been invited merely to observe) and in these groups different disciplines were represented. These groups were invited to discuss, among themselves, the present position of marine biology and to formulate ideas on what might be done in marine biology in the future.

There were 14 plenary sessions in which 35 papers were presented, and there were five sessions for the idea groups. The papers presented in the general sessions ranged widely through synecology, biochemistry, taxonomy and genetics. It was a feature of the symposium that some papers were presented by workers from fields other than the marine biological field. For instance, E.S. Guzman Barron, of the Department of Medicine of the University of Chicago, presented a paper on " The Regulatory Mechanisms of Cell Respiration " and C.S. Pittendrigh, of the Department of Biology of Princeton University, gave a most arresting paper on " Perspectives of Endogenous Rhythms in Cells and Organisms " ; and one of the most stimulating of the papers was that by A. Szent-Gyorgyi on " Motion, Energy Transmission and the Cellular Matrix. "

Having thus heard papers ranging from almost classical general descriptive ecology to most profound analytical physiology, the symposium, in its final session, heard a kind of quiz session, in which R.R. Revelle addressed questions to half a dozen specialists, each representing one of the idea groups. In this session, the specialists were asked to indicate some of the problems which they thought it would be most interesting to investigate.

The sponsors of this symposium are to be congratulated on a most successful meeting.

Permanent Commission for the International Fisheries Convention (1946)

The Permanent Commission of the above Convention held its Fifth meeting in London from 8 to 11 May 1956. The meeting was attended by delegates from the thirteen member countries, also by observers from the U.S.S.R., the International Council for the Exploration of the Sea (ICES), the International Commission for the Northwest Atlantic Fisheries (ICNAF), and FAO.

As at the fourth meeting (see *FAO Fisheries Bulletin*, IX (1): 36-37) discussion concerned mainly the arrangements for enforcing the provisions of the Convention, the industrial fisheries, and the minimum size of mesh of trawl nets. Following a recommendation made at the previous meeting, Mr. C.J.W. Westhoff (Netherlands) was appointed as a temporary officer of the Commission to advise contracting governments, at their request, with regard to enforcement problems, and to report back to the Commission. The United Kingdom has already requested his services.

A committee was appointed to examine the replies that had been received from all member countries, reporting infractions of the Convention found during 1955 and the enforcement action that had been taken. This committee recommended that routine inspection of nets should be made regularly both at sea and in port, and the results recorded in standard form, as also should the returns on infringements. Draft forms for these purposes were prepared.

A second committee was set up to study the difficulties that arise in administration of Article 6 of the Convention (this article provides that vessels fishing in the convention area for certain exempted species may carry and use nets having meshes less than the specified sizes), and to consider means of overcoming the problems. This committee, consisting of representatives from Belgium, France, the Federal Republic of Germany, the Netherlands, Poland and Sweden, will report back to the Commission at its next meeting.

No new action was taken by the Commission regarding the Industrial Fishery for Whiting, a memorandum on which was submitted by the Liasion Committee of ICES.

A highlight of the meeting was undoubtedly the masterly presentation of the report of the Ad Hoc Committee by its Chairman, Mr. Rollefsen. This committee was established at the previous Commission meeting to receive and report on information concerning the selectivity of different sized cod end meshes of trawls for the fish species covered by the Convention, and concerning the effects upon the stocks, both immediate and long term, of applying various minimum mesh sizes, and to consider the legal size limits for each species in relation to those findings. The result of the committee's work was a very full document which, in effect, set out in

simple terms the whole basis of the theory of conservation of fish stocks by mesh regulation and size limits, and the method of performing the necessary computations in practice. This document is to be edited and then translated into the languages of all the countries signatory to the Convention, to facilitate discussions between the fisheries administrators and members of the industries, concerning the problems that arise when such regulative action is taken.

The theory and calculations described in the report were then vividly illustrated by a demonstration by Mr. Michael Graham and Mr. R.J.H. Beverton, of what was described as the " Lowestoft Dynamic Model. " In this contrivance several hundred steel balls, representing a year-brood of fish, are fed into a hopper and, in falling, are distributed by a random process and in several stages (representing successive years of life) into a series of receivers, the contents of which represent catches, natural deaths or surviving fish. The " catches " of each year class, when weighed on a lever balance constructed so that account is automatically taken of the differences in weight of fish of different ages, give a representation of the steady annual yield from a stock, and the sorting mechanism is adjustable so that varying " natural death " and " fishing " rates can be simulated. The model was used to demonstrate both the immediate and long-term effects of changes in mesh size and in the fishing effort. The U.K. Government is to supply working drawings of the model to interested countries, and the desire was expressed that a demonstration film of it might be made. This development has great potential value for training and study courses in the dynamics of fish populations.

Towards the close of the meeting, Mr. Klaus Sunnanaa (Norway) was elected President of the Commission in succession to Mr. R.G.R. Wall (U.K.) ; and M.A. Alloy (France) succeeded Mr. Gunnar Rollefsen as Vice-President.

The Commission will hold its next meeting in London, starting on 14 May 1957.

American Geophysical Union (AGU)

The 37th Annual Meeting of the AGU took place in Washington, D.C., from 26 April to 4 May 1956.

The Symposium on the Antarctic, sponsored jointly by the U.S. National Committee for the International Geophysical Year and the National Science Foundation, was held on 26 and 27 April, and the following papers, of interest to fisheries, were presented :

Ronne, F.	" The Weddell Sea Area "
Eklund, C.R.	" Antarctic Fauna and Some of its Problems "

The Sections on Meteorology, Oceanography and Hydrology met 30 April and 1 May, during which the following papers of interest were presented:

Donn, W.L., Milič, P., and Brilliant, R.M.	"Gravity Waves and the Tropical Sea Breeze"
Harding, E.T.	"Weather Information and Forecasts in a Fleet Operation"
Malone, T.F.	"The Role of Probability in the Communication of Weather Information"
Williams, H.B.	"Disaster Warnings"
Brunk, I.W.	"Automatic Distribution of Weather Information and Forecasts"
Hoover, R.A.	"The Characteristics of Hurricanes Associated with Rapid Rises in Sea Level"
Leipper, D.F.	"Sea Temperature, Statistics, and Shallow-Water Tidal Currents"
Schule, J.J.	"Comparison of Sea Ice Conditions in the American Arctic"
Wagner, L.P.	"Hydrography of the Cay Sal Bank Region"
Fleming, R.H.	"Circulation and Water Masses of the Gulf of Alaska"
Donn, W.L.	"On the Prediction of Storm Tides Generated by Northeast Storms"
Freeman, J.C., Jr. and Baer, L.	"Graphical Computation of Hurricane Storm Tides"
Harris, D.L. and Pore, A.	"Case Studies of Recent Storm Surges"
Brewer, M.C.	"The Thermal Regime in Arctic Lakes"

United Nations Statistical Commission

The Ninth Session of the United Nations Statistical Commission took place at the UN Headquarters in New York, from 16 April to 2 May 1956. Representatives from 14 countries and from Specialized Agencies attended the meetings. Mr. L.P.D. Gertenbach, Fisheries Division, and Mr. P.L. Sherman, Economics Division, attended on behalf of FAO.

Among the reports discussed by the Commission was a paper reviewing the development of statistical standards by the United Nations and the Specialized Agencies during the past two years. In an oral statement, Mr. Gertenbach, on the invitation of the Chairman, amplified those paragraphs covering the work of FAO in fisheries statistics.

Another item of great interest to the statistical activities of the FAO Fisheries Division was that on external trade statistics, under which heading the Commission considered, *inter alia*, a memorandum (Doc. No. E/CN. 3/199/Add.1) prepared by FAO in con-

sultation with the Secretary General of the United Nations. This paper follows from the recommendations of the Statistical Commission in paragraph 13 of its Report on its Eighth Session, which took place in Geneva in April 1954, when it recommended that "wherever the size of the landings is of importance and wherever it is possible to do so, countries should include in their import statistics fish landed directly from foreign fishing craft, and include in their export statistics fish landed abroad by domestic fishing craft."

The Commission, in a footnote to this paragraph, also indicated that further study was necessary to (1) specify the commodities which should, on landing, be included, and (2) amplify the definitions of fishing craft. The Commission indicated that the Secretary General had to examine the question in consultation with FAO.

It was therefore proposed to the Commission at its Ninth Session, in this Memorandum:

> that wherever they are important, marine products of all kinds be included in national import statistics when landed directly from a foreign fishing, hunting or gathering vessel, and be included in national export statistics when landed abroad directly from a domestic fishing, hunting or gathering vessel. Furthermore, it is proposed that the same treatment be accorded, whenever they are important, to the result of processing marine products on board ship at (or en route from) the fishing, hunting or gathering grounds whether the processing takes place in the original fishing, hunting or gathering vessel or in another vessel to which the goods were transferred at sea.
>
> Upon inclusion in the statistics the goods referred to above should not be classified together but should be distributed among the appropriate headings of the United Nations Standard International Trade Classification just like any other goods moving in external trade.
>
> The goods to which the previous paragraphs refer include the following: fish; whales, seals and other aquatic mammals; aquatic birds; amphibians; turtles, sea snakes and other aquatic reptiles; crustaceans, mollusks, sea cucumbers, sea urchins and other aquatic invertebrates; pearls, sponges, shells and other aquatic animal residues; plankton; seaweeds and other aquatic plants and their residues. Also included are: dressed, preserved and otherwise processed commodities derived principally from aquatic animals and plants, e.g., fresh, frozen, dried, salted and smoked fish, whalemeat, crustacea, etc.; canned products of aquatic animals; skins of aquatic animals; meals, solubles, fertilizers edible and inedible oils, waxes and glues derived from aquatic animals or plants; chemicals derived from the water.

These proposals were endorsed by the Commission in Resolution 5 (IX) to be incorporated in their Report to the Economic and Social Council on the activities of the Ninth Session. The Resolution reads as follows:

> (*a*) Wherever they are important, marine products of all kinds be included in national import statistics when landed directly from a foreign fishing, hunting or gathering craft,* and be included in national export statistics when landed abroad directly from a domestic fishing, hunting or gathering craft,* and

*The description of the craft should, where appropriate, be taken to include mother ships and other vessels which take part in the fish catching, fish processing and fish transportation and related operations.

(*b*) the same treatment be accorded, wherever they are important, to the result of processing marine products on board ships (or en route from) the fishing, hunting, or gathering grounds whether the process takes place on the original fishing, hunting or gathering craft or in another craft to which the goods were transferred at sea.

International Fishery Trade Fair 1956

An International Fishery Trade Fair was held from 18 to 27 May at Copenhagen, Denmark. A wide range of products was exhibited, which included engines, boats, fishing gear, echo sounders, deck equipment, fish processing and fish handling machinery, etc.

Mr. D.D. Tapiador of the Technology Branch, visited the Fair on behalf of FAO.

Further information may be obtained from the International Fishery Trade Fair Secretariat, Puggaardsgade 10, Copenhagen V, Denmark.

Fisheries Division Activities

Headquarters

Mr. Colin Beever, of the Economics and Statistics Branch, Headquarters, went to Bangkok, Thailand, on 1 May, to carry out duties in the Office of the Regional Fisheries Officer, pending the arrival of a successor to Dr. Miles.

Mr. F.E. Popper, Chief of the Economics and Statistics Branch, during his visit to the Far East, had discussions with fisheries officials in Pakistan, India, Thailand, Malaya, Singapore, Indonesia, Japan and Hong Kong. It is hoped that, as one of the results of these discussions, studies will be undertaken of the functions of the middlemen in fishing communities and the effects of co-operative development among fishermen in the Region.

Mr. Jan-Olof Traung, Chief, Fishing Boat Section, Technology Branch, visited Göteborg recently, to discuss with the Swedish Board of Fisheries the design for a Swedish research vessel, the preliminary plans of which he had prepared. Mr. Traung also visited boat building yards in Norway, to inspect small fishingcraft which FAO have under construction for the use of FAO master fishermen working in Ceylon, Egypt, Haiti, India and Sudan.

The Biology Branch has started work on a catalogue of fishing seasons, and on the cataloguing and coding of species of fish of commercial value. The Branch is engaged in compiling a Thesaurus,

which will be a compendium of information concerning the species of fish caught in various countries and regions, the economic value of stocks and species, and the productivity of marine and inland waters in all parts of the world.

Regional and Field Work

Appointment

Dr. Cecil Miles has been appointed Regional Fisheries Officer in Santiago, Chile, succeeding Dr. B.F. Osorio-Tafall, who is leaving the Organization to take up an appointment with the UN Technical Assistance Board.

Readers are referred to the previous report on field activities in *FAO Fisheries Bulletin* IX(2) : 102-4.

Fisheries Biology

Dr. A.W. Meschkat (Germany), terminated his four-month assignment as inland fishery biologist in Yugoslavia in February 1956. His duties were to advise the Government on methods of more intensive exploitation of natural stocks of fish in the lakes and rivers, with regard to the effects of increased catches on these populations. During his mission he made a detailed survey of the techniques and equipment used by the fishermen in the lakes, rivers and other inland waters, and has now made many recommendations for improvement of their equipment and modernization of their methods.

Dr. Franz Berger (Austria) returned in March from his three-month assignment in Finland, where he assisted the Government in the training of men in up-to-date methods of water chemistry and pollution determination, and advising on the measures necessary to protect fish from pollution, especially with regard to paper-mill wastes.

Prof. C.J.D. Brown, professor at the Montana State College, Bozeman, and Consultant for the Montana Fish and Game Department, Yellowstone and National Parks, U.S.A., took up a twelve-month appointment in Paraguay in April, as inland fishery biologist. He will assist the Government in carrying out a survey of the inland waters and inland fisheries resources. On the results of this survey he will recommend measures which can be taken to maintain these resources, develop the fishing industry and increase the resources. He will also make a survey of the past and present means of fisheries management in Paraguay and fish cultural activities, and make recommendations.

Dr. Hans-Joachim Elster, Director of the Hydrobiological Station, Falkau, and lecturer at the University of Freiburg, Germany, took up his duties in Egypt early in May as inland fishery biologist in continuation of the project started by K.W. Jensen (Norway) in 1955. His duties are to assist the Government in the detailed formulation and prosecution of the program of investigation of the

productivity, both primary and secondary, of the Noussah Hydrodome, and of experimentation to determine the levels of productivity under the various conditions of exploitation.

Fisheries Technology

Mr. H.A. Lynch (Canada) returned in April 1956 from Iraq, on completation of a seven-month assignment as consultant on fishways. During his mission he made a survey of fishways at the barrages and dams on the Euphrates and Tigris rivers and their tributaries. He has completed 20 detailed drawings for fishways, and a number of these designs have already been adopted and incorporated in barrages and dams under construction. He has submitted plans and designs for fishways for proposed dams and barrages ; and has suggested modification where the fishways already constructed are inadequate.

Mr. G.S. Illugason (Iceland) passed through Headquarters at the end of April 1956, proceeding on home leave from his assignment in India, where he has worked since early 1954 as a Master Fisherman assigned to Madras State.

He has operated two Danish-built (provided by FAO) 22-ft. open motor boats of 10 h.p. on the Coromandel, Gulf of Mannar and Malabar Coasts, using nylon gill nets, shark long lines and small trawls. The bottom set nylon gill nets have proved to be so effective that, when rented to the local fishermen, they landed five times more fish than they did with their cotton bag nets.

Mr. Illugason has located rich shrimp trawling grounds which stretch for at least 140 miles (224 km.) on the Malabar Coast, between Beypore and Mangalore ; the grounds are about 4 miles (6.4 km.) wide in 1½ to 5 fathoms' depth. With a 10 h.p. boat the catch has averaged over 100 lb. (45.4 km.) of shrimps per hour, using a small Japanese trawl.

In order to demonstrate convincingly the efficiency of mechanized fishing and of the new gear, Mr. Illugason has rented out nets and motorboats to Indian fishermen of several villages and, already during these training periods, they have invariably multiplied their earnings. Consequently, there is now a strong demand for nylon nets, small open motor boats and trawl gear, and the Madras Government has included in its Five-Year Plan the provision of considerable quantities of such equipment. Private companies have also been formed to utilize the rich shrimping grounds. They have rented the government-built freezing plants and are acquiring boats.

Mr. P. Lusyne (Belgium), fishery training specialist, assisted the Government of Bombay State, India, in conducting a training center for fishermen in Satpati, which terminated in April 1956. As a result of the teaching, the fishermen could work the demonstration gear competently, navigate the boats and operate the engines. They also learned how to make and repair the gear and rig it for fishing. Local Satpati fishermen were impressed by

the mechanical hauling and shooting of the gill nets and by the superior catching power of the nylon nets. They were made aware of the possibilities of trawling, of rigging the gill nets as set nets on the bottom, instead of their bottom-drifting method, and were taught the use of plastic floats, buoy lights, canvas bag floats, as well as of the usefulness of sailing markers in the channel and the practical value of dead reckoning in fishing.

Mr. Lusyne is now stationed at Cochin to conduct a further training center.

Dr. Meschkat has now assumed, as from April 1956, a twelve-month appointment in Amazonas, Brazil, as fisheries specialist, to advise and assist the Government in the formulation and implementation of a fishery policy relating to the Amazon region. He is carrying out a reconnaissance survey to determine : (*a*) the availability of fish stocks; (*b*) the possibility of introducing improved methods of catching, storing and utilizing fish, with particular regard to the craft and gear employed in catching fish ; (*c*) the extent of any further technical assistance that may be required ; (*d*) the need for provision of fishery services ; and (*e*) the measures necessary to stimulate economic development of a fishery industry.

Economics and Statistics

Two statisticians, both from India, Dr. V.G. Panse, Statistical Adviser to the Indian Council of Agricultural Research, and Dr. K.V.R. Sastry, Assistant Professor of Statistics of the Indian Council of Agricultural Research, have been assigned to Egypt, the former on a short-term assignment, before proceeding to Mexico as a member of the Board at the FAO Training Center on Experimental Design and Survey Techniques of Agricultural Experimentation, April 1956 ; the latter on a twelve-month assignment. They will advise and assist the Government in the formulation and operation of a statistical service.

By courtesy of the Canadian Government, Mr. I.S. McArthur, full-time Chairman of the Fisheries Prices Support Board of Canada under the Ministry of Fisheries, and Chief Administrator of the Fishermen's Indemnity Plan, Canada, was released in April 1956 for a short-term assignment to Turkey as Fisheries Consultant. His duties are to advise the Government on (*a*) a comprehensive formulation of its general policies in regard to fisheries, and in particular with regard to the financing of fishery development, and (*b*) the planning of organizational measures to implement such policies.

Current Fisheries Literature

Selected Publications

FWS 9.11 OCEAN CURRENTS UDC 551.46

Arbeitsgemeinschaft für Forschung des Landes Nordrhein/Westfalen 1956 [Working Party for Research in Nordrhein Westfalen]. *Heft* 49. Westdeutscher Verlag. Cologne and Opladen, W. Germany. 109 pp., figs. In German. Price : DM. 10.20.

Contains two papers.

Bohnecke, G. "Zeitfragen der Ozeanographie" [Review of Present Knowledge in Oceanography].

The author emphasizes the importance of the sea food resources. Gives a well presented review of oceanographical problems in easily understandable form for non-specialists, and different ways of collecting oceanographical data. There is a description of the currents, physical and chemical features and biology of the Atlantic Ocean and the North Sea. The author also gives special attention to the problems of turbidity and long-term changes.

Gabler, H. "Nautische Technik und Schiffssicherheit" [Nautical Techniques and Safety of Ships].

A description of modern navigation instruments, their principles, construction, testing and uses.

FWS 9.1 MARINE BIOLOGY UDC 57

Cushing, D.H. Production and a Pelagic Fishery. *Fishery Investi-* 1955 *gations*, (H.M. Stationery Office, York House, Kingsway, London, W.C.2.). Series II, Vol. XVIII, No. 7. 104 pp., figs., tables, illus., bibl. In English. Price : 12*s.* 6*d.*

Contains a most important comprehensive review of present knowledge, and develops precise methods for studying the identity, numbers and distribution of *Calanus* and diatom patches, and the dynamic relations between nutrients, diatoms, herbivorous zooplankton and pelagic fish. Data is presented in full.

FWS 9.12 MARINE BIOLOGY UDC 57

Marshall, S.M., and Orr, A.P. *The Biology of a Marine Copepod*, 1955 Calanus finmarchicus (*Gunnerus*). Oliver & Boyd, Tweeddale Court, Edinburgh, Scotland ; 39A Welbeck Street, London, W.1. 188 pp., figs., refs., index. In English.

Gives a full account of present knowledge of the general biology and ecology of this important marine copepod.

FWS 6.3 PLANKTON UDC 593.7

DAVIS, CHARLES C. *The Marine and Fresh Water Plankton.* Michigan
1956 State University Press, East Lansing, Mich., U.S.A. 562 pp., figs., refs., index. In English. Price : U.S. $10.00.

A textbook on planktology. Contains several chapters on general biology and ecology of plankton, and a chapter on taxonomy of both fresh-water and marine plankton.

FWS 1.015 FISHES — CEYLON UDC 597 (548.7)

MUNRO, IAN S.R. *The Marine and Fresh Water Fishes of Ceylon.*
1955 Department of External Affairs, Canberra, Australia. 351 pp., figs., bibl., index, plates. In English.

Written after the author's visit to Ceylon under the Colombo Plan, this handbook provides a key to all known species of fish in Ceylonese waters. Details of taxonomic significance are shown in line drawings, and over 800 species are illustrated in black and white plates. There is an index of scientific and vernacular names in English, Singhalese and Tamil.

FWS 0.8 WATER PURIFICATION UDC 628

Vom Wasser. Ein Jahrbuch für Wasserchemie und Wasserreinigungs-
1956 *technik* [Water - a Yearbook of Water Chemistry and Water Purification]. Verlag Chemie, GmbH., Bergstr., Weinheim, W. Germany. Vol. 22, 1955. 438+74 pp., figs., tables, index. In German. Price : DM. 31.80.

No. 22 in the series of yearbooks of water chemistry and purification, edited by the Committee on Water Chemistry of the Union of German Chemists. Contains contributions from numerous authors on water chemistry, chemical methods, planktology, fisheries biology, and pollution.

FWS 9.6 FISHERIES INDUSTRIES UDC 639.2

ROSEN, NILS (Editor). *Svenskt Fiskerilexikon* [Swedish Fisheries En-
1955 cyclopedia]. AB Nordiska Uppslagsböcker, Stockholm, Sweden. 707 pp., illus. In Swedish. Price : S.Kr. 95.

Handbook on fish and fisheries presented as an encyclopedia, with contributions from 70 Swedish fisheries workers. Covers both commercial and sport fishing. Among the main subjects are : administration, anatomy, fish handling, boats, fish ponds, echo sounding, economy, fish production, fishing ports, fishing gear, training, law, consumption, fishways, freezing, associations, insurance schemes, oceanography, ice, navigation, plankton, fish processing.

FWS 1.041 FISHERIES INDUSTRIES — NORWAY UDC 639.2 (481)

GERHARDSEN, G.M. Fifty Years of Norwegian Fisheries, 1905-1955.
1955 *Papers from the Institute of Economics*, No. 1. The Norwegian School of Economics and Business Administration, Bergen, Norway. 20 pp., tables, graphs. In English.

A brief history of the fleet and manpower, the catch and exports during the last 50 years. The development of marine and technological research and of governmental administration during the same period. The background for, and foundation of, the fishermen's organizations between the two world wars.

FWS 1.015 FISHERIES INDUSTRIES — KOREA UDC 639.2 (519)

1954 *Rehabilitation and Development of Agriculture, Forestry and Fisheries in South Korea.* Columbia University Press, New York. 414 pp., tables, figs., app. In English.

This report, prepared for the UN Korean Reconstruction Agency (UNKRA) by a mission selected by FAO in 1952, was intended as a five-year program for agriculture, forestry and fisheries.

Part IV deals with fisheries, and is based on the work of P.E. Paulson, fisheries specialist for Canada.

Section 1 is a very brief general history and description of the fisheries industry — the fishing areas and ports, vessels and gear, service facilities, government supervision and fisheries education.

Some space is devoted to fisheries organizations. Under a law of 1929, fishermen in Korea must belong to a fishery guild. The guilds buy fishing supplies, arrange loans and other financial assistance for their members, and handle consignment sales as well as direct marketing of members' fish catches. There are 168 guilds in the Republic of Korea at the local community level, organized in eight fishery federations on a provincial level.

Section 2 consists of analysis and recommendations in the fields of administration, research, regulation, education, storage, processing, handling and marketing, including recommendations for the rehabilitation and development of the industry and for the ecouragement of co-operatives.

FWS 1.015 FISHERIES INDUSTRIES — INDIA UDC 639.2 (540)

1956 *Progress of Fisheries Development in India.* Published on the occasion of the First All-India Fisheries Exhibition, Cuttack, 1956. Central Inland Fisheries Research Station, Orissa, India. 96 pp., figs., illus. In English.

Contains the following papers :

CHOPRA, B. N. "Fisheries and Fishing Industry in India"
BHATIA, D. "The Second Five-Year Plan of Fisheries Development"
PANIKKAR, N. K. "Marine Fisheries Research in India"
BHIMACHAR, B. S. "Inland Fisheries Research and Extension in India"
CHIDAMBARAM, K. "Deep Sea Fishing in Indian Waters"
ZIENER, P. B. "Mechanisation of Indian Fishing Craft"
MITRA, G. N. "Reclamation of Swamps for Fishery Development in Orissa"
ALIKUNHI, K. H. "Fish Culture Techniques in India"
VENKATARAMAN, R. "Fish Preservation and Processing"
KINI,Sundar. "Fish Oil Industry in India"
MOHANTY, G. B. "Fisheries By-Product Industry in India"
PILLAY, T. V. R. "Socio-Economic Development of Fishermen Communities in India"

FWS 1.013 FISHERIES INDUSTRIES — ARGENTINA UDC 639.2 (82)

1955 CORDINI, JUAN MANUEL. Rio Paraná, sus peces mas comunes, pesca comercial [The most Important Fishes and the Commercial Fishery of the Rio Paraná]. *Publicación Miscelánea* No. 410, Ministerio de Agricultura y Ganadería, Buenos Aires, Argentina. 86 pp., tables, map, figs., illus. In Spanish.

A short description of the Rio Paraná and its fisheries, including an account of the principal commercial species with their common and scientific names, fishing seasons, notes on behavior and a reproduction of the current fishing regulations. There is an extensive illustrated description of the local fishing gear and methods including net preservation, and a glossary of fishing terms.

FWS 9.10 FISHERIES RESEARCH, BIOLOGICAL UDC 639.2.001.5

Journal of the Faculty of Fisheries and Animal Husbandry, Hiroshima 1955 *University.* The Faculty of Fisheries and Animal Husbandry, Hiroshima University, Fukuyama, Japan. Annual. Vol. 1, No. 1, 200 pp., August 1955. Papers in English, German and Japanese.

This first issue of the *Journal* contains five papers, of which the following are of interest to workers in the aquatic sciences :

TAKAAI IRIE "The Crystal Texture of the Otolith of a Marine Teleost, *Pseudosciaena*" (in English).
TORAYA FUJIYAMA "On the Life History of *Prasiola japonica* Yatabe" (In English).

FWS 9.16 FISH CULTURE — SPAWNING UDC 639.3.03

FUSTER DE PLAZA, MARÍA LUISA AND PLAZA, JUAN CARLOS. Nuevos 1955 ensayos para obtener la reproducción artificial de las percas o truchas criollas (*Percichthys* sp.) [New Experiments to Obtain Artificial Reproduction of the Indigenous Perches, or "Trout"]. *Publicación Miscelánea* No. 407, Ministerio de Agricultura y Ganadería, Buenos Aires, Argentina. 48 pp., illus., Bibl. In Spanish.

Contains a preliminary account of the experiments conducted by the Rio Limay Fish Culture Station at Plottier (Neuquén) to induce the artificial spawning of various indigenous serranid fishes of the genus *Percichthys,* locally known as ' perch" or "trout," in the Rio Negro region of Patagonia. Describes the methods used and the obstacles encountered, and the measures taken for their solution. For successful hatching it was found desirable to maintain the temperature of the water above 16°C. (61°F.).

FWS 1.015 FISHERIES RESEARCH, TECHNOLOGICAL — CEYLON UDC 664.95.001.5 (548.7)

FISHERIES RESEARCH STATION, DEPARTMENT OF FISHERIES, CEYLON. 1955 *Progress Reports Biological and Technological,* No. 1. Director of Fisheries, Fisheries Research Station, Galle Fage, Colombo. 23 pp., figs., illus. In English.

This, the first of a series of reports of progress in fisheries research in Ceylon, contains the following articles :

LANTZ, A. W., and GUNASEKERA, L. D. "An Investigation into the Keeping Qualities of Ungutted Fish from the Trawlers"
————. "Preservation of Fish"
————. "Fishery By-products — Liquid Fish Meal"
SIVALINGAM, S., and MEDCOF, J. C. "Study of Wadge Bank Trawl Fishery"
DURAIRATNAM, M., and MEDCOF, J. C. "Ceylon Moss — a Marine Source"
CANAGARATNAM, P., and MEDCOF, J. C. "Ceylon's Beach Seine Fishery" *Bulletin* No. 3 of the same Department, "Commercial Utilization of Dolphins (Porpoises) in Ceylon," by A. W. Lantz and C. Gunasekera has also been received.

Other Publications Received

IPFC Special Publications No. 3. "Economic Marine Algae of Tropi- 1955 cal South and East Asia and their Utilization." J.S. Zanefeld, and

1955 *IPFC Occasional Paper* No. 55/2. "Sampling Methods Used in Japanese Fisheries Catch Statistics." Tadashi Tamamoto. Indo-Pacific Fisheries Council, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.

1955 *Bulletin* No. 2, International Commission for the Northwest Atlantic Fisheries. "Review of the Oceanography of the North Pacific." R.H. Fleming. Vancouver, B.C., Canada.

1956 *Fishing Industries Handbook and Buyers' Guide* 1956. *South African Shipping News & Fishing Industry Review.* Box 2598, Cape Town, Union of South Africa; Tothill Press Ltd., 33 Tothill Street, London, S.W.1.

1956 *Nord- og Sør-norsk naeringsliv — Fiskeindustri, Fiskerier Produksjon og Handel* [North and South Norwegian Industries — Fish Processing Industry — Fisheries — Production and Commerce] 1955/1956. Halvorsen & Larsen, Oslo, Norway. (formerly the *Årbok for Norges Fiskerier*).

1956 *Ship & Boat Builder Annual Review* 1956. John Trundell (Publishers) Ltd., Temple Chambers, Temple Avenue, London, E.C.4.

Administrative Reports

1955 ARGENTINA *Producción pesquera de la republica argentina años* 1946-53. Ministerio de Agricultura y Ganadería, Departamento de Investigaciones pesqueras, Buenos Aires.

1955 CEYLON *Administration Report of the Acting Director of Fisheries for 1951.* Part IV, Education, Science and Art (L). Government Publications Bureau, Colombo, Ceylon. 90 cents.

1955 EAST AFRICAN FISHERIES RESEARCH ORGANIZATION. *Annual Report* 1954/55. P.O. Box 343, Jinja, Uganda.

1956 SWEDEN. Institute of Freshwater Research. *Annual Report for the Year 1954* (and short papers). *Report* No. 36. Drottningholm, Sweden.

STABILIMENTO TIPOGRAFICO FAUSTO FAILLI — ROMA